GAS JOURNAL, FEB. 8, 1939

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Editorial Notes

War Risks—Compensation and Insurance

THE country as a whole, and industrialists in particular, have awaited eagerly some statement from the Government on the question of compensation for war risks. The Chancellor of the Exchequer took the opportunity of making a statement on this vital matter on the first day after the House of Commons had reassembled. The statement was essentially one of a preliminary and general nature, and it is only possible on broad general lines to indicate the intentions of the Government. Further details will, of course, be supplied in the report on the matter which the Chancellor promised to issue immediately, and there will be ample opportunity to investigate and debate every aspect of the question during the passage of any legislation through Parliament.

With the general principle of Sir John Simon's statement few will disagree. War risks cannot be carried by the ordinary insurance company, and it is obviously inequitable that those who are singled out by chance to suffer damage in war, either to their person or their property, should be left to bear the whole of the burden so fortuitously imposed upon them. The State must come to the aid of the individual in such cases. It is gratifying to know that this is the declared policy of the Government. In any new war the danger would not be solely or even mainly borne by those in the front line. There would probably be no front line, and members of the civilian population, whether men or women, would be in equal peril with those who are actually serving in the Forces. That the compensation to the civilian or his dependants should be neither more nor less than that to the private soldier is in our view consistent with justice and equity.

With regard to the destruction of property, the question is admittedly one of greater difficulty. As Sir John Simon pointed out, any form of insurance scheme "collecting premiums from owners and undertaking to pay in full for any subsequent damage whatever may be its extent" is impracticable, as "no possible basis for an actuarial calculation exists." Further, the circumstances of the country after, and not before, the conflict must be taken into consideration. Generally speaking, therefore, it would not be possible for the State to pay compensation until the end of the conflict, although the extent of the damage must be assessed as soon as possible after it had occurred. The recording of damage will be in the hands of the Valuation Office of the Inland Revenue, and a Compensation Board presided over by a Judge will be set up.

Of vital interest to the Gas Industry is the fact that the Chancellor admitted that in certain particular categories of property it would be impossible to defer the payment of compensation, and that a plan has been worked out for the reconstruction of essential property. Details of this plan are not yet available, but it is obvious that any delay in the reconstruction of gas-works and other public utility property would be impossible. The public will require to be assured that a chance bomb from the air will not be able to deprive them for an uncertain period of the means of cooking, heating, and lighting.

The scheme to which Sir John Simon referred will be eagerly awaited by those who have to bear the responsibility of supplying the community with the primary and essential commodities of water, gas, and electricity.

The Fuel Department at Leeds University

ON a later page we give an extract from the Report of the Livesey Professor at Leeds University for the session 1937-38. The report has special interest in that it is the last to be made by Professor J. W. Cobb, who retired from the Livesey Chair in June last and was succeeded by Dr. D. T. A. Townend. Professor Cobb was appointed to the Chair in 1912 and his work for the Gas Industry since that time has had much bearing on its progress and prosperity. In 1910, when the Livesey Chair was first endowed, there was little organized industrial research in this country. Before the Joint Research Committee of The Institution of Gas Engineers and Leeds University came into being the Industry had no organization for embarking upon research, no staff, no one to choose problems or assess the value of the results of investigation. The Industry owes a very great deal to Professors Cobb and Smithells for their leadership in this direction. In 1910 no one could have envisaged the progress which has since been achieved.

Men trained at Leeds to apply their minds to the fundamental problems of fuel production and utilization have in no small measure contributed to the advance of the Gas Industry; the fact that many now occupy prominent positions in the Industry is in itself tribute to Leeds training. Professor Cobb has seen the Fuel Department at Leeds University

grow, under his guidance, into maturity. In his first report he recorded that the number of registered students specially attached to the Department was ten, as against seven for the previous year. With 41 students in training, the position to-day is somewhat different. In 1912, Mr. H. J. Hodsman—who, as Professor Cobb remarks in his final report, has been "the unflagging tutor and friend of many generations of students"—and Dr. H. Hollings, now Chief Gas Chemist to the Gas Light and Coke Company, constituted the staff. The present number is 13. The work of the Joint Research Committee is now one of the most prominent and valuable activities of the Department, and has developed to the extent that three research chemists and five research assistants are engaged in it. The work has laid firmly the scientific foundations of the Gas Industry by the chemical and thermal analyses of its processes for both manufacture and utilization.

The growth of the Department has naturally been accompanied by an increased and increasing demand for working space. Originally the Department shared with the Mining Department a building erected by the use of donations from the Mining Industry. In 1929 the West Yorkshire coal owners gave the Mining Department £25,000 for a new home, and relieved the pressure created by the expansion of the Fuel Department's work and numbers. At that time £8,000 was spent on refitting and minor extensions. Since then further growth in the work of training and research has again created a position in which the possibility of further expansion will be conditioned by the provision of more laboratory accommodation. Only a few weeks ago we visited the Department and were able to appreciate only too well how acute the position is. The accommodation which is available to the research staff of the Institution is quite inadequate, and it would be salutary if members of the Institution made themselves acquainted with the conditions under which work of first-rate importance to the Industry has to be carried out. It is a problem which the Institution should try to help to solve. In a chat we had recently with Professor Townend—he allowed us to record some of his impressions as Livesey Professor in the "JOURNAL" for Jan. 4—he suggested that the success of a scientific department to-day depends largely on its reputation for original investigation. Few will quarrel with his contention. Only by keeping this aim in the forefront will the best young brains be attracted and in turn passed on to the industries it serves. To achieve this at Leeds more space and more equipment are essential. As a matter of fact, Professor Townend took with him to Leeds certain apparatus and one or two young men. To avoid upsetting the present activities of the Fuel Department he has had to commence his own research work—research which has great significance for the Gas Industry in view of the increasing possibilities of high-pressure technique—in an outhouse. There must be a way out of the difficulties: and the Gas Industry could do worse than consider more closely the affairs of its own research workers.

Benzole Recovery

IN December last the "JOURNAL" carried out an analysis of the question of whether or not benzole recovery at gas-works is profitable. The results of our calculations, which were made after a very careful investigation of actual works costs, were published in the "JOURNAL" for Dec. 14. We expressed the opinion that the influence benzole recovery has on the price at which the gaseous therm can be made was insufficiently appreciated. We showed clearly what the Gas Industry is missing if it cannot dispose of the extra coke consequent on benzole recovery. We repeat that it is losing heavily, and once again we urge development of the coke market in a limitless field. In the "JOURNAL" for Dec. 14 we said: "The installation of a benzole plant on the gas-works automatically creates a new and very large consumer for gas. This consumer is very adaptable and does not demand a regular supply as does the ordinary consumer. In case of an emergency demand the benzole plant can temporarily be taken out of operation." We also called attention to the importance of benzole recovery from the point of view of national welfare.

In the "JOURNAL" last week we published substantial extracts from two Papers on the subject of benzole recovery which were presented to the Eastern District of the Scottish Junior Gas Association. One was by Mr. F. B. Waller, of Alloa; the other by Mr. W. N. Baird, of Dunfermline. Mr. Waller confined his attention to the stripping of coal gas manufactured in continuous vertical retorts, and he put forward many data to support his conclusions, which were as follows: (1) Benzole recovery from coal gas is a sound revenue-producing proposition when gas is manufactured in continuous vertical retorts; (2) a regular quality of gas is supplied with a reduction in sulphur compounds and naphthalene; (3) a better quality of coke as a smokeless fuel is produced due to reduced steaming in the retorts; (4) the Gas Industry is playing its part in providing this country with a home produced motor spirit and helping to solve the unemployment problem in the coalfields. We are glad the Author stressed the advantage of benzole recovery in effecting a reduction in the sulphur content on the gas supplied. On many occasions we have emphasized the importance of this advantage. Sulphur in gas costs gas undertakings a great deal of money. The life of gas appliances is shortened, maintenance costs are increased, the satisfaction and goodwill of the consumer are impaired—all due to that bugbear of sulphur. We do not know what the corrosion caused by sulphur costs the Gas Industry directly and indirectly, but it must be an enormous sum. The saving due to reduction in sulphur compounds should be credited to benzole recovery. Mr. Waller explained in his Paper that prior to the commencement of benzole recovery the sulphur present in the purified gas was approximately 10 grains per 100 cu.ft.—in itself a very low figure—but oil washing immediately brought about a 40% reduction.

Unjustified Qualms

THE Paper by Mr. Baird was an argument against benzole recovery. He referred to our analysis published on Dec. 14 and contended that we had quite missed the point. On the premise that the extra coke due to benzole recovery can be sold, we showed in a startling way the very real financial advantages of benzole recovery. Mr. Baird started off with the assumption that the extra coke cannot be sold, or at any rate that the additional coke would depress the general market and wipe out the profit from benzole. One of the main purposes of our analysis was to indicate the vital importance of the coke market in cheapening the cost of gas production, in lowering the cost of gas to the consumer. Mr. Baird has qualms about the coke market; we cannot think these qualms are justified. Since 1932 an addition of at least 750,000 tons of coke annually has been placed on the London market, and it has been absorbed. We have maintained time and again that there is not enough general drive to develop the coke market. We wonder whether Mr.

Baird has an open coke fire. We can assure him that our open coke fire has come in for a great deal of favourable comment. We know of an instance where, in a road of 25 houses, one householder installed an open coke fire. It was not very long before 19 of those 25 houses were similarly equipped. Why should there be such a coke scare? Evidence given before the Departmental Committee on the methods and costs of solid fuel distribution—we publish a report of the public enquiry in our issue to-day—does not indicate a decrease in the demand for coke; and to suggest that anything like saturation has been reached is to adopt a defeatest attitude. The field is enormous.

His fears of the coke market lead Mr. Baird to advocate heavy steaming or the production of more water gas in external plant. If the coke cannot be sold, these are the obvious policies—but they mean dearer gas. Mr. Baird puts forward data on the financial aspect of benzole recovery as applied to his own undertaking. His Paper, remember, is an argument against benzole recovery. On his own showing, if benzole recovery were practised at Dunfermline and coke and tar prices remained at existing levels and the extra quantities could be sold, he would make a net profit on benzole of £541 for recovery of a gallon per ton of coal carbonized. For the last financial year there was a deficit of £1,114 on the working of the Dunfermline Gas Undertaking. On the assumptions regarding the coke and tar markets, recovery of 2 gallons of benzole per ton of coal carbonized would just about have wiped out that deficit. Surely this should encourage Mr. Baird to develop the coke market.

Research on Coke

On a later page we publish an article referring to the Jubilee Memorial Lecture given by Professor Riley under the auspices of the Society of Chemical Industry. Professor Riley's work on coke structure has been commented on before in these columns, and it may be asked where the work is leading us. Perhaps it is hardly fair to ask this question at this stage. Maybe Professor Riley gives as near an answer as can be expected to-day when he emphasizes the critical nature of the temperature of 700° C. For purposes for which a hard coke is needed—and it must be confessed that there do not seem to be very many—we shall continue to carbonize at the highest temperature possible. There is an evolution of hydrogen above 700° C. accompanied by contraction in volume and an increase in density leading to a secondary increase in strength. For all domestic, and most other, purposes, the next generation of gas engineers may come to the conclusion that coke heated above 700° C. is spoiled coke. To-day, we have to consider not only the yield of therms of gas, but also the commercial efficiency of our plant, which involves consideration of the rate of making gas per retort or per sq.ft. of ground area. We are forced to work at higher temperatures. It may be otherwise in time to come. We may then find that we shall carbonize coal to 700° C. in one stage, and some (or all) of the coal to higher temperatures in the second stage. We may collect the gas separately, producing coal gas in the first stage, and hydrogen in the second stage, the hydrogen being used either for total gasification in accordance with the possibilities inherent in the Leeds experiments, or for hydrogenating oils and tars. Possibly the hydrogen collected during our second-stage carbonization would be used for treating the carbonizing mass during the first-stage carbonization. There are, when one comes to think of it, immense possibilities of future development in the long-range scientific work which is being conducted to-day, and it behoves gas engineers generally to take an interest in what is being done in our universities.

Another development foreshadowed by Professor Riley's work is the carbonization of coal under pressure. Some of this work has already been reported in other places. It is now found that the effect of pressure, as might be expected, is noticeable only during the plastic stage. Strength, according to the latest results, is developed in coke in two temperature stages. During the plastic stage the strength increases with increase of temperature and of applied pressure also; above 700° C. the strength increases with temperature increase, but is independent of the pressure between the limits of 0·7 and 480 lb. per sq.in. This result indicates that above 700° C. powerful cohesive forces come into play, probably connected with the liberation of metallic electrons caused by the desorption of extraneous atoms or groups attached to the border carbon atoms. Increase of pressure during the plastic stage has two effects. It was pointed out in 1932 by Foxwell (Fuel, XI., 370) that the formation of coke and the strength of coke were alike due to pressure within the plastic layer since this enabled the fused binding material to be used to the best effect. The experiments at Leeds of The Institution of Gas Engineers of the hydrogenation of coke have shown that treatment with hydrogen under pressure causes much greater fusion of the coking coal than would occur without pressure. The combination of these two factors may well be the cause of the increased hardness in coke by carbonization under pressure, which has become evident from Professor Riley's work. This work may lead us to the use of inferior coking coals for gas-making purposes, since these coals yield more combustible cokes than do the good coking coals, and in addition it may one day be necessary to conserve the good coking coals.

It may well be asked whether Professor Riley has adequately taken into account the effect of macrostructure on the reactivity of cokes. Cokes made from such non-coking coals as those mined in Leicestershire and Warwickshire possess a charcoal-like macrostructure which appears to lend itself to absorption of gases by reason of their minute pore-development. Presumably, these cokes do not possess a graphitic crystal structure markedly different from those of other coals made at the same temperature, so we are constrained to ask whether the present theories based on crystal structure are in themselves sufficient to explain the behaviour of cokes. We know that for a complete explanation of the coking process a combination of plastic state with crystal formation is necessary, and, perhaps, in hailing Professor Riley's work on the interior structure of coke we ought not to forget external phenomena.

Amalgamation and Grouping

Caledonian Gas Corporation and Airdrie.

For over twelve months negotiations have been proceeding between Airdrie Town Council and Coatbridge Gas Company with regard to the acquisition of Airdrie Municipal Gas Undertaking, and this has now been complicated by an offer made by the Caledonian Gas Corporation, Ltd. In this connexion a plebiscite of the ratepayers is to be taken in the course of this month as to whether the gas undertaking should be sold to the Coatbridge Gas Company, or any other firm, or retained by the Town Council. At a recent meeting of Airdrie Town Council it was stated that the Caledonian Gas Corporation had previously refrained from approaching the Town Council because of negotiations with the Coatbridge Gas Company. They now intimated that the amalgamation of the interests of their West Lothian Companies with the Airdrie undertaking would enable them to provide a better and much cheaper gas service, while their undertaking has the advantage of purchasing contracts made by the parent company and the assistance of its technical and sales personnel.

Letters to the Editor

Noisy Working Meters

SIR,—In the Paper entitled "Meters and Standards" which appeared in your issue of Jan. 25 I read a statement to the effect that meters which are noisy in working are rejected as likely to develop friction or cause annoyance to a consumer.

May I ask through the medium of your publication what is the authority for the rejection of meters solely on account of noise which is considered likely to cause annoyance to a consumer?

The Statutory Rules and Orders 1920, No. 2,354, do not appear to give power to reject a meter for noisy working unless the noise gives "evidence of any mechanical defect which can be reasonably and practically prevented in good meters."

Yours, &c.,
Metropolitan Gas Meters, Ltd.,
J. H. BINGHAM,
General Manager.

Hyson Green,
Nottingham,
Feb. 4, 1939.

Frost Damage to Water Heaters

SIR,—May I call attention to a point in last week's article on this subject (Feb. 1, p. 288) with which I cannot agree? I refer to Note No. 4.

If the hot water tap is of the ordinary pattern no cold water would pass through it when connected to the water main as the author suggests. The effect would be that the pressure of the cold water acting on the top of the washer of the hot water tap would press it firmly on its seating, and so prevent any cold water passing through.

If, however, the hot water tap was of a type in which the washer is positively raised when the tap is opened, the cold water would pass through, but this would not necessarily mean that the expansion pipe was not frozen.

If the expansion pipe was frozen, but the cold water supply tank was not, then the cold water would be forced into the cold water supply tank causing it to overflow.

The same result would happen if neither the tank nor the expansion pipe was frozen, as the outlet of the expansion pipe being higher than the tank the water would rise in the tank and overflow before it reached the level of the outlet of the expansion pipe.

From your article the user is given to understand that if the cold water flows into the hot water tap everything is right, whereas I have endeavoured to show that this does not follow.

Yours, &c.,
VERNON E. MARSHALL.

20, *St. Clare Road,*
Colchester.
Feb. 3, 1939.

Personal

Mr. GEORGE EVETTS, M.Inst.C.E., M.Cons.E., has been appointed a Director of the Bombay Gas Company.

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Subject to the approval of the Halifax Town Council, Mr. JAMES MCLUSKY has been appointed Gas Engineer and Manager, in succession to his father, Mr. W. B. McLusky, who retires on May 1. The Corporation Light, Heat, and Power Committee, after considering many applications for the post of Gas Engineer and Manager reduced them to a short list, and these applicants were interviewed and the works of which they have charge were inspected. As a result of their investigations, the Committee came to a unanimous decision by ballot to recommend Mr. McLusky's appointment.

Mr. James McLusky is a Member of The Institution of Gas Engineers. His present position is Engineer and General Manager of the Calverley and Horsforth District Gas Company, a post he has held for the past eighteen years.

Mr. McLusky commenced his engineering career at Leven, Fifeshire, and after preliminary workshop training went to Halifax when his father was appointed Engineer and Manager. He joined the staff at the Halifax Gas-Works, and during the War took a commission in the Royal Air Force. After the War he became Technical Assistant at the Huddersfield Gas-Works for a period, returning to Halifax as Superintendent in the Gas-Works before taking his present post at Calverley. Mr. McLusky, who is forty-four years of age, is a Past-President of the Yorkshire Junior Gas Association.

Forthcoming Engagements

February.

9.—Midland Juniors.—Visit to Wolverhampton Works of the British Oxygen Company, Ltd.

11.—Scottish (Western) Juniors.—Paper by D. Beavis, of Helensburgh, on "The Modern Domestic Field."

14.—London and Southern Juniors.—Paper by A. Ronca on the 1937 Factory Act (at the H.O. Industrial Museum).

14.—N.G.C.—Central Executive Board, 2.45 p.m.

15.—I.G.E.—Domestic Heating Committee, 2.30 p.m.

16.—B.C.G.A.—District Meeting in London.

16.—S.B.G.I.—Council Meeting, 2.30 p.m.

17.—B.C.G.A.—District Meeting at Exeter.

17.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.

18.—Scottish (Western) Juniors.—Annual Whist Drive and Dance.

20.—B.C.G.A.—District Meeting at Cardiff.

20.—L.C.C.A.—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.

21.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.

21.—I.G.E.—Ad Hoc Committee on Text Books, Gas Industry House, 5 p.m.

22.—B.C.G.A.—District Meeting at Newcastle.

23.—B.C.G.A.—District Meeting at Birmingham.

23.—B.C.G.A.—Annual Meeting of Members in Scotland, North British Hotel, Edinburgh, 2.30 p.m.

23.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Payment of Commission to Employees."

23.—Joint Junior Visit to B.I.F.

25.—Scottish Juniors.—Joint Meeting at Edinburgh. Paper by M. Whittaker, of Robert Dempster & Sons, Ltd., on "Gasholders."

25.—Yorkshire Juniors.—Meeting at Barnsley Technical College. Paper by H. K. Lister, of Holmfirth, "Personal Experiences on a Small Gas-Works."

February 28-March 2.—B.G.F. Joint Gas Conference.—B.I.F., Castle Bromwich. (For programme, see "JOURNAL" for Jan. 25, p. 220.)

March

2.—Midland Juniors.—Paper by F. N. Tidball, "Structural Principles in the Design of a Waterless Gasholder."

4.—Manchester and District Juniors.—Annual Dinner. Paper by E. Bates, "Operation of Intermittent Vertical Chamber Ovens Combined with Coke Dry Cooling Plant."

7.—B.C.G.A.—Executive Committee, 2.30 p.m.

9.—Midland Association.—Spring General Meeting. Presidential Address of G. C. Pearson.

11.—Scottish (Western) Juniors.—Visit to Dixon's Coke Ovens, Govan Hill, Glasgow.

13.—Scottish (Eastern) Juniors.—Visit to Newbattle Colliery of the Lothian Coal Company, Ltd.

14.—London and Southern Juniors.—Paper by L. F. Randall, "The Servicing of Gas Apparatus."

15.—B.C.G.A.—Scottish Conference at Saltcoats.

16.—Midland Juniors.—Visit to Staveley Coal and Iron Company, Ltd., Chesterfield.

18.—Wales and Monmouthshire Juniors.—Meeting at Pontypridd. Paper by K. Muir.

18.—Western Juniors.—Meeting at Exeter. Visit to Works of Willey & Co., Ltd. Paper by F. A. Rhead.

18.—Yorkshire Juniors.—Meeting at Bradford. Paper by R. Anderson, "Gas-Fired Heating Installations at Bradford."

24.—Southern Association.—Annual General Meeting, Hotel Victoria, W.C. 2, 2.30 p.m. Presidential Address of F. Blackburn.

25.—Scottish (Western) Juniors.—Annual Business Meeting, Christian Institute, Bothwell Street, Glasgow. Address by W. McL. Dick.

29.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Fuel Economy in Gas-Works."

30.—Midland Juniors.—Paper by H. G. Broadbridge, "Recent Developments in Control of Continuous Vertical Retorts."

News of the Week

The Brightest Spot on Market Hill, Sudbury, during a recent electricity failure was the showrooms of the Gas Company.

During the Last Two Years, states the "Russia To-day" Press Service, gas for cooking purposes has been installed in more than 20,000 flats.

At a Special Meeting of the Llandudno Council it was unanimously decided to oppose the Conway Gas Company's Bill, to be brought before Parliament in the near future for permission to extend the boundary of their supply area to include parts of Llandudno.

Why it had been Necessary to increase the price of gas was explained to the St. Helens Town Council by Alderman W. Burrows, Deputy-Chairman of the Gas Committee, recently. The price of coal had risen by 5s. 4d. per ton since January, 1936, and this meant an additional expenditure of £22,000 per year.

A Ten Years' Contract for the public lighting of the Borough of Grantham has been obtained by the Grantham Gas Company as from April next. Not only have the Company been successful in obtaining this contract in competition with electricity, but this is the first occasion on which a long-term contract has been given, previous ones having been on a three years' basis.

The Minister of Health has Approved in principle the Plymouth Council's proposals for the provision of new and improved offices and stores accommodation at the Keyham Gas-Works, and tenders are now to be invited for the work. The Engineer and General Manager, Mr. F. Blackburn, reported an increase of 1·49% in the output of gas for December as compared with the corresponding period of the previous year.

Record Sales of gas are reported by Penrith's Gas Engineer (Mr. G. Hudson). The Undertaking, during the nine months ended Dec. 31 last produced 4,326,000 cu.ft. more than in the corresponding period of 1937. In the month of December the increased output was 1,556,600 cu.ft. and up to Jan. 24 this year an increase of 1,732,200 cu.ft. over the same period last year is reported. The week ending Dec. 24, 1938, showed a record consumption of 3,156,400 cu.ft.

About Sixty Members of the Peterborough Engineering Society visited the Gas Light and Coke Company's Fulham Works on Feb. 4.

Cookery Demonstrations were recently given by the Prestonpans Gas Company in the Company's showrooms, the lecturer being Miss J. T. M. Watson.

An Interesting Lecture illustrated by lantern slides was given by Mr. W. B. McLusky, Chief Representative of Messrs. Sidney Flavel & Co., Ltd., at the showrooms of the Leamington Priors Gas Company on Jan. 30. Mr. McLusky dealt with the development of "Flavel" cookers, panel heaters, and gas fires during recent years and explained the points to be watched by gas fitters to make sure that the best results were obtained.

A Market for Surplus Coke Oven Gas in the Gas Industry was mentioned in the report issued last week by the Scottish Economic Committee on "Scotland's Industrial Future—The Case for Planned Development." It was stated that under present circumstances the outlook for the steel industry may be considered as promising, but there were "disquieting elements in the pig iron industry." Complete modernization of coke ovens and iron works was once more stated to be the solution, and what was needed to remedy the situation "is that gas undertakings should agree to purchase gas from coke oven owners for industrial use and distribution to domestic consumers."

A New Scale of Gas Charges has been approved by the Stockport Town Council. This increases the price slightly to small consumers and reduces it to large consumers. As a compensation for the increase the minimum stand-by charge of 5s. is to be halved. The Gas Committee made these decisions on reconsidering the question of abolishing the minimum charge and introducing meter rents, which had been deferred at a previous meeting. They will take effect as from the March quarter meter reading. The new scale starts at 10d. per therm for the first 18 therms, as against the present charge of 9·4d. There is a slight increase for consumption up to 1,800 therms and thereafter the price shows a gradual fall in comparison with the existing scale. Outside the Borough 0·4d. per therm extra is charged.

Institution of Gas Engineers

Leverhulme Research Awards, 1939

Application is invited for (i.) Fellowships or (ii.) Grants in aid of research. The Fellowships or Grants are intended for senior workers who are prevented from carrying out research work by routine duties or pressure of other work. They are limited to British-born subjects normally resident in Great Britain. In exceptional circumstances the Trustees may waive the condition as to residence.

The duration of the awards will not normally extend over more than two years or less than three months, and the amount will depend on the nature of the research and the circumstances of the applicant. Any subject which may add to human knowledge may be proposed for a Fellowship or Grant, but preference is given to subjects in which other provision for research is inadequate.

Applications must be received on or before March 1, 1939. Awards will be announced in July, and the Fellowships or Grants will date from Sept. 1, 1939.

Forms of application may be obtained from the Secretary of The Institution of Gas Engineers.

Dates of Examinations.

The Examinations of The Institution of Gas Engineers in Gas Engineering (Manufacture) will be held on April 29, and in Gas Engineering (Supply) on May 6, 1939. The Oral Examinations will be held in London on June 28, 1939.

Application.—Forms of Application for External Candidates can be obtained from the Secretary of the Institution and have to be returned to him not later than Feb. 28.

Charles Hunt Memorial Medals.—Candidates for the Diploma Examinations in Gas Engineering (Manufacture) and Gas Engineering (Supply) are eligible for the award of the Charles Hunt Memorial Medals.

Qualifications for Membership of the Institution.—The Diploma in Gas Engineering (Manufacture) or (Supply) and the Higher Grade Certificate in Gas Engineering (Manufacture) or (Supply) will admit to Corporate Membership, and the Ordinary Grade Certificate in Gas Engineering (Manufacture) or (Supply) to Studentship of the Institution, provided the other conditions stated in the By-Laws are fulfilled.

Forms of Application for Admission to the Institution can be obtained from the Secretary of the Institution.

The following dates are of special interest to Examination Candidates:

1939.

FEB. 28.—Last date for receipt of applications to sit for Diploma Examinations and Ordinary and Higher Grade Examinations in Gas Engineering (Manufacture) and (Supply).

APRIL 2.—Last date for receipt of Diploma Theses.

APRIL 29.—Examinations in Gas Engineering (Manufacture):

Ordinary Grade—		2 to 5 p.m.
Higher Grade	—Part I.	2 to 5 p.m.
	Part II.	6 to 9 p.m.
Diploma	—Part I.	2 to 5 p.m.
	Part II.	6 to 9 p.m.

MAY 6.—Examinations in Gas Engineering (Supply):

Ordinary Grade—		2 to 5 p.m.
Higher Grade	—Part I.	2 to 5 p.m.
	Part II.	6 to 9 p.m.
Diploma	—Part I.	2 to 5 p.m.
	Part II.	6 to 9 p.m.

MAY 27.—Last date for receipt of Examination Results in Ancillary Subjects.

JUNE 28.—Oral Examinations in London.

JULY 19.—Publication of Examination Results, prior to which information about individual results will not be available.

Members of The Institution of Gas Engineers will be welcome at the undermentioned Meeting:

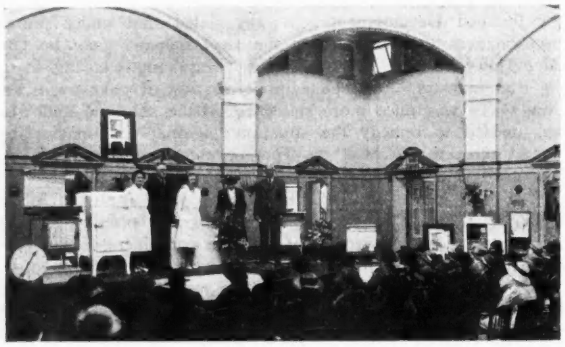
The London and Southern District Junior Gas Association to be held at the Home Office Industrial Museum, 97, Horseferry Road, London, S.W. 1, on Feb. 11, at 7.30 p.m. A Paper will be presented by Mr. A. Ronca on the Factories Act, 1937.

"Magic Meals" Demonstrations in Tasmania

The Demonstrations in the Albert Hall, Launceston, Tasmania, in November last, which were conducted by Mr. Craig, with Miss Hesper Thompson as assistant, proved extremely popular. The Hall was filled to capacity and the audiences were most enthusiastic. The evening Lecture took the form of a Business Girls' Session, which drew a crowded house.

During Miss Thompson's stay in Launceston she personally conducted several sessions over the local radio stations, and no doubt this was responsible for many of the ladies attending. The large crowds were a tribute to the public acceptance of gas in Launceston and also to the splendid co-operation given by the Launceston Gas Company.

On the following week a further series of five sessions was held on three successive days in the Masonic Hall, Hobart. The programme allowed for three afternoon and two evening sessions, including a Business Girls' Session on the Wednesday evening.



Opening Session of the Hobart Demonstrations. On the platform (left to right): Miss D. Parker, of the Hobart Gas Company, Mr. H. T. Craig, Miss Hesper Thompson, Mrs. Ogilvie, wife of the Premier of Tasmania, and Mr. H. A. Chalmers, Secretary of the Gas Company.

The Hobart Gas Company were fortunate in obtaining the interest of Mrs. A. G. Ogilvie, wife of the Premier of Tasmania, to perform the opening ceremony. Mr. Ogilvie, as Premier of Tasmania, is head of the State Hydro-Electric Scheme, and it was indeed a tribute to gas that Mrs. Ogilvie should graciously consent to open the demonstrations, and further that she should publicly announce that she personally used a "New World" gas cooker for her own cooking.

The demonstrations were then commenced after light music had been rendered by the orchestra and Mrs. Ogilvie had been presented with a basket of flowers by Miss Thompson. Miss Dorothy Parker, the lady demonstrator of the Hobart Company, shared the actual demonstration work with Miss Thompson.

As usual, the chained and padlocked oven dinners were received with instant approval, and the five demonstrations were attended and followed with equal enthusiasm to those at Launceston. A special feature of these demonstrations was the baking, icing, and decorating of a Christmas cake by Miss Parker.

In Hobart, as well as Launceston, invitations were sent to the senior girls of the various local schools, and a splendid attendance of girls improved their knowledge of cooking and were also introduced to gas refrigeration. Souvenir printed pencils were handed to each girl with recipe sheets and leaflets.

Generally the demonstrations at both Hobart and Launceston proved highly satisfactory in every way.

Fuel Department of Leeds University

In his final Report to the Coal Gas and Fuel Industries Committee on the work of the Fuel Department of Leeds University for the session 1937-38, Professor J. W. Cobb is able to record an increase in students to 41, from 37 in 1936-37. He explains that the work on the influence of furnace atmospheres on the scaling properties of plain carbon and alloy steels has been continued with the support of the Alloy Steels Research Committee. Dr. Richardson and Mr. Simister, under the direction of Mr. Preece, are completing general surveys at high and low heat-treating temperatures. A report on this work was presented to the Alloy Steels Research Committee in May last, when it was agreed to add a Carnegie Research Scholar to the staff engaged upon it. Mr. G. Parker (B.Sc., Leeds) has been elected to the Scholarship. A full account of this investigation will be published in the second report of the Alloy Steels Research Committee to the Iron and Steel Institute at the Annual Meeting next May.

Graduates.

The following students completed Degree Courses with the results stated:

B.Sc. Honours.

Gas Engineering, 1st Class—G. Brook, A. Milner, S. Muller; 2nd Class—F. Taylor, H. Taylor, G. A. Woodwark.

Fuel and Metallurgy.

1st Class—R. V. Riley.

B.Sc., Ordinary.

W. Dougall, A. T. Barlow, G. R. Saville.

The degree of D.Sc. was conferred upon H. Hollings (M.Sc.) for research work in gas engineering.

Appointments.

Hugh Taylor, B.Sc., Technical Assistant, Newark Corporation Gas Department.
G. Brook, B.Sc., W. C. Holmes & Co., Ltd., Huddersfield.
F. Taylor, B.Sc., Ashmore Benson, Pease & Co., Ltd., Stockton-on-Tees.
G. A. Woodwark, B.Sc., Gas Light and Coke Company.
S. Muller, B.Sc., Gas Light and Coke Company.
R. V. Riley, B.Sc., United Steel Company, Ltd., Sheffield.
M. D. Auchterlonie, W. C. Holmes & Co., Ltd., Huddersfield.
G. E. Hall, B.Sc., Coke Oven Works Manager, Dorman Long & Co., Middlesbrough.
K. Higginson, B.Sc., Woodall-Duckham Companies, London.
L. P. Ingram, M.Sc., Engineer and Manager, Loughborough Corporation Gas Department.
D. G. Woolfenden, B.Sc., H.M. Inspector of Factories.
Ashleigh Milner, B.Sc., British Aluminium Company, Ltd.

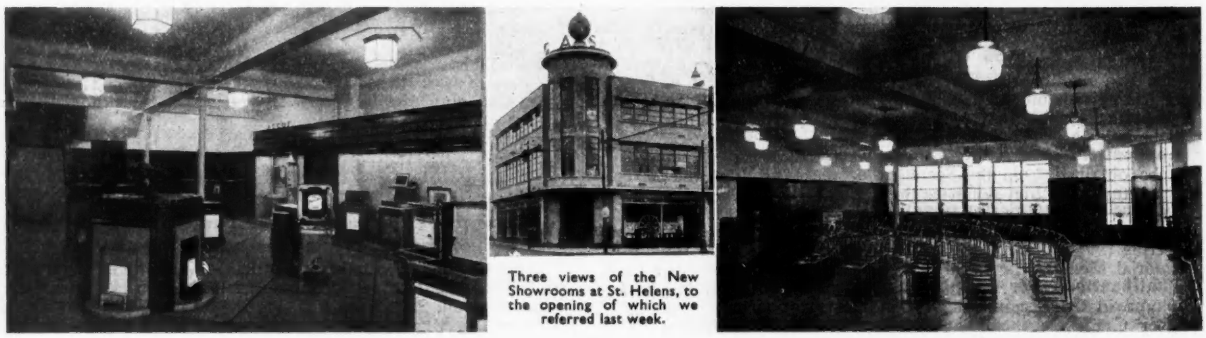
Cooking and Beauty Lectures for Stroud Housewives

Much interest was shown at the recent Beauty Parlour and Cooking lectures arranged by the Stroud Gas Light and Coke Company in conjunction with Radiation Limited.

Miss D. Lissimore, of the Radiation Research Kitchen, gave the lectures, and illustrated on "New World" gas cookers how food cooked in automatically controlled ovens, with balanced menus, helps in retaining good health and good looks.

The attendance for each afternoon session was 100 and for each evening 57.

The immediate results of these demonstrations were quite gratifying and the success of the venture was due to the excellent arrangements made by Mr. Barber, Sales Manager at Stroud.



Three views of the New Showrooms at St. Helens, to the opening of which we referred last week.

Master Plumbers Visit Water Heater Works

Facilities for Training.

A useful step towards the establishment of cordial relations between plumbers and the Gas Industry was effected last week by a visit by the Master Plumbers' Federation of Manchester to the Neasden Works of Ascot Gas Water Heaters, Ltd.

Nearly a hundred members accepted the invitation, and prior to the inspection of the works they were entertained at luncheon in the fine new canteen—the largest party so far to be catered for in this building. After their tour of the works the visitors returned there for tea, when a hearty welcome was extended to them on behalf of the firm by Mr. H. Friedman.

Mr. Friedman referred to the value of co-operation between plumbers and the Gas Industry, and mentioned the facilities which Ascot Gas Water Heaters, Ltd., offer for the training of plumbers and gas undertakings' fitting staffs in the installation and maintenance of "Ascot" heaters. The classes are held from Wednesday to Friday each week, and those attending are provided with hotel accommodation, including bed and breakfast, while they are also given their lunches and teas free of charge in the works canteen. Mr. Friedman expressed the hope that advantage would be taken of these facilities, which would lead, through efficient installation and maintenance, to greater customer satisfaction and development of the gas water heating field.

On behalf of the Federation, Mr. Butterworth voiced the thanks of the visitors for a most interesting afternoon and for the firm's hospitality. Referring to co-operation with gas undertakings, he said that while they were ready and anxious to co-operate in the installation of gas water heating appliances, the position, as it existed in many quarters to-day, was that a customer could walk into the gas showroom and get an appliance supplied and fixed at a price lower than the plumbers could economically ask. He made an appeal to gas undertakings to remedy this state of affairs by the standardization of prices which would enable the fuller co-operation on the part of the plumber with an adequate margin of profit. He assured Ascot Gas Water Heaters, Ltd., of their wish to do all they could to promote the gas water heating load.

A.R.P. Notes

Birkenhead and Wallasey Propose Linking-up Mains

As already noted in these columns, negotiations have taken place between the Gas Engineers of Wallasey and Birkenhead with regard to a scheme for providing inter-connexion between the gas mains of Wallasey and Birkenhead, and other air raid precautions measures.

The scheme, as reported to the Birkenhead Gas Committee, involves the provision of direct inter-connexion between the North End gasholder and the Birkenhead Gas-Works and the Wallasey gasholder, at an estimated cost of £4,450; the provision of inter-connexion between large distribution gas mains at the Birkenhead-Wallasey boundary in Hoylake Road, at an estimated cost of £1,200; and the provision of new gas boosting machinery and duplicate plant at the works by installing new plant in the existing compressing house at a cost of £2,341, and in the event of the Minister not approving the loan sanction, to erect a new building at a distance of 90 yd. from the compressing house and include connexions at an estimated cost of £4,450.

It was recommended that the cost of the scheme, estimated at £10,000, should be defrayed by means of a loan sanction from the Minister of Health.

Malton Gas Company

The annual report of the Malton Gas Company states that during the year a gasholder has been replaced by one of more than double the capacity and a new 12-in. main has been laid from the Works to Norton. This has enabled the Company to increase the pressure throughout the district and an adequate supply should be available at all times. The expenditure on revenue account as compared with a year ago has increased by more than £740 and receipts show a decrease of over £300. The increased expenditure is accounted for by repairs to Works, depreciation, extra cost of coal, and wages. The profit is £2,741, but to make it comparable with the corresponding period of 1937 depreciation amounting to £365 should be added. This makes a total of £3,079 against a profit of £3,783, or a reduction of £704. The Directors recommend a final dividend for the half-year of 5¼%, free from income-tax.

Gas Equipment for Stockport Secondary School

Our photograph illustrates the gas-heated catering equipment recently supplied to the Stockport Secondary School by Messrs. James Stott & Co. (Engineers), Ltd. All the equipment is gas heated and we give below a list of the appliances:

A combination service counter, consisting of gas-heated cupboard, with latest thermostatic gas control and cold service counter. The whole of the cupboard is finished in enamel with stainless steel top.

Two gas-heated hotcupboards and carving tables in enamelled finish, with thermostatic controls and stainless steel tops, complete with stainless steel dishes for meat, soup, sauces, gravies, &c.

A "Masterset" café fountain, for water-boiling, coffee-making, and milk-warming; coffee urn complete with the well-known "Stott" Perco Filtro system of clarified coffee-making.

An automatic food and vegetable steamer, entirely pressureless in its action, fitted with the latest type thermostatic gas control and automatic water supply.

The school is a magnificent example of modern building practice, and the gas equipment fully in keeping with it.

The installation was carried out by the Stockport Gas Department.

Further Contracts for West Yorkshire Gas Grid

Plan to Supply Industry with Cheap Efficient Fuel

Contracts worth £212,400 for the laying of high-pressure gas mains—the first part of the underground artery for the West Yorkshire Gas Grid System—have been placed by the United Kingdom Gas Corporation. Work on the pipe laying has already begun simultaneously at twelve different parts of Yorkshire. The contracts involve the laying of over 50 miles of 18-in. diameter pipe at an average cost of more than £3,500 a mile.

With the £350,000 now being expended by the Hemsworth and United Kingdom Coke Oven Company, Ltd., for erecting at Hemsworth the plant which will provide some of the gas for the grid, and with pipe-laying contracts previously placed, the full value of the work now in hand in connexion with the grid is nearly £600,000.

The principal contractors engaged for the main-laying are the London firm of William Press & Son, the Norwest Construction Company, Ltd., of Liverpool, Squires & Son, Ltd., of Selby, and William Mulcaster, of Crewe.

To fulfil the contracts it is understood that more than 1,700 men will be engaged, no fewer than 1,500 being recruited from the unemployed in the many localities to be served by the grid. The new pipe-laying wage bill amounts to £48,000 and more work will be provided on further sections when this initial stage is completed. The high-pressure pipeline ring will encircle an extensive and densely populated area embracing widely diversified industries.

The contracts placed this week bring one stage further the first of a series of parallel schemes planned by Colonel W. Moncrieff Carr, Managing Director of the United Kingdom Gas Corporation. The pipe-laying activities begun last week extend north and south from Wetherby to Hemsworth and east and west from South Milford to Pudsey, embracing in their scope Bramham, Allerton, Drighlington, Morley, East Ardsley, Rothwell, Kippax, Aberford, Castleford, Glass Houghton, Ackton, and Featherstone.

Gas Light and Coke Company Accounts

Dividend Maintained Over a Difficult Period

The year 1938 presented difficulties of a special kind to the business world, and it was hardly to be expected that the Gas Industry would escape entirely the adverse influences which stalked at home as well as abroad. More especially when one reflects upon the very close bearing of certain of these adverse factors upon an Industry which is forced to rely upon coal as its chief raw material, and which is affected so much by weather conditions. Over the weather the Industry can have no control; and the same remark would seem to apply to a great degree to the price of coal, which has been mounting up to such an extent as, in company with other rising costs, to force a number of gas undertakings to do that which they are anxious above all things to avoid doing. That is to say, in many instances these rising costs have compelled the making of small increases in the price of gas.

This has been the case with the Gas Light and Coke Company, whose accounts for the past year show that, while some few thousands of tons less coal was carbonized, its cost, including all expenses, was very nearly £70,000 more, and along with this there has been a quite substantial increase—some £135,000—in the items which are embraced under the heading of "Distribution." More than one-half of this increase is in the amount appearing for depreciation and renovation of meters and appliances. From the figures reproduced on this page, it will be seen that the situation has been greatly helped by the better return from residuals, of which coke heads the list with a gain of £143,000. These larger receipts for residuals, together with some savings in wages and salaries, and a reduction of nearly £140,000 in the amount charged for maintenance and renewal of works and plant, have resulted in the gross profit being not only maintained, but slightly improved upon.

This being so, at the Annual General Meeting next Friday the proprietors will be asked by the Board to agree to the maintenance of the dividend on the ordinary stock at the rate of £5 12s.% per annum, which, with the consequential contribution to the Redemption Fund, will leave £53,598 to be carried forward to the credit of the current year. The amount carried forward a year ago was £102,376.

More Public Lamps.

While the accounts reveal a slight falling off in the total quantity of gas sold, this is no more than may be readily accounted for by the unfavourable influences to which reference has been made above. Until the "White Christmas," which came almost too late to help the 1938 accounts of the gas companies, the Industry was rather badly "let down" by the abnormally mild weather conditions during a great part of last year. So far as gas consumption is concerned, a poor summer does nothing to make up for an unduly mild spring or autumn; and then, of course, there were all the other unsettling influences. More normal times may be relied upon to be accompanied by a resumption of those increases in consumption to which the Industry has been so long accustomed. Meanwhile, it will be noted with satisfaction that during 1938 the number of public gas lamps in the Company's area increased from 52,430 to 53,632; the quantity of gas used for public lighting having been 5,665,129 therms, as compared with 5,529,878 therms in 1937. At the same time, the amount of gas used in "sundry processes" shows some increase—from 14,808,242 therms to 14,821,900 therms. Further figures with regard to gas production and sales are given in the table.

Comparative Figures.

The Capital Account shows expenditure during the year of £113,279 on land, buildings, and machinery, and of £171,816 on mains and service pipes. The charge for new meters was largely offset by the depreciation allowance, while new appliances figure at less than the sum included for depreciation. Thus the net addition to the Capital Account for the year is small. The result is that there remains a balance on Capital Account of £2,584,719.

The Revenue Account shows that the net cost of gas making—that is, deducting the revenue from residuals from the manufacturing charges—was £2,894,892, which compares with £3,120,915 for the year 1937, when, as has been pointed out, the quantity of gas produced was slightly greater, at 286,751,280 therms, as against 281,780,239 therms in 1938. The gas sold by meter was at 8·7d. and 9d. per therm (higher prices being charged in certain outer areas) and special contracts, including sundry processes. In 1937 the charge was 8·7d. per therm. There is a statement at the foot of the Revenue Account to the effect that the total wages paid in the year 1938 amounted to £3,684,540, and the salaries to £1,200,532. The figures for 1937 were: Total wages £3,703,454 and salaries £1,133,046. Wages for manufacture of gas came to £343,536 in 1938 and £358,049 in 1937. On this occasion the gain in receipts from public lighting is over £4,000, at £240,493.

Balance-Sheet Items.

The balance-sheet shows that the sum at credit of Capital Account has been reduced from £2,706,492 a year ago to £2,584,719, while the temporary loan from bankers has been raised from £550,000 to £700,000. Cash at bank and in the Company's hands is reduced from £349,937 to £195,967, while stores on hand figure at about £263,000 less—that is, £2,458,565. The biggest item on this side of the balance-sheet is "Hire-purchase and deferred payment accounts (less reserves)," which is shown as £4,192,345, as compared with £4,338,194 in 1937; while, on the other hand, the amount invested in allied undertakings has been increased from £658,510 to £666,129.

The Directors record the great loss which has been sustained by the death of Mr. C. C. S. Fooks, who had been a Director of the Company for eight years, and previously Chairman of the Grays and Tilbury Gas Company, and also by the death of Mr. W. L. Galbraith, who retired owing to ill-health from the Secretaryship of the Company in 1937.

Jointly with other London undertakings, the Company have deposited a Bill in Parliament for the making of regulations with respect to the installation of supplies of gas and of gas-fired appliances to, and in, premises in the County of London, and for other purposes.

COMPARATIVE FIGURES FROM THE ACCOUNTS.

Revenue Account Expenditure.

	1938.	1937.
	£	£
Manufacture of gas	5,792,754	5,896,179
Distribution	4,267,059	4,132,273
Public lamps—lighting and repairing	138,032	139,788
Rents, rates, and taxes	616,992	560,110
Management	259,159	266,088
Co-partnership	130,602	124,877
Annuities and superannuation	274,050	301,781
Other miscellaneous charges	106,098	110,350
	£11,584,746	£11,531,446
Gross profit	2,065,551	2,050,175
	£13,650,297	£13,581,621

Revenue Account Receipts.

	1938.	1937.
	£	£
Gas rental	8,808,386	8,825,575
Meter "	447,572	442,345
Appliances rental	981,511	1,005,741
Fittings (prepayment supplies) rental	439,031	458,670
Miscellaneous receipts	75,935	74,026
Residual products (*less* labour, &c.)—		
Coke	2,276,686	2,133,553
Breeze	149,406	109,307
Tar and tar products (including benzole)	464,128	525,731
Ammoniacal liquor and sulphate of ammonia	7,642	6,673
	£13,650,297	£13,581,621

Coal and Gas Oil Used.

	1938.	1937.
Coal carbonized, tons	3,400,942	3,407,937
Gas oil used, galls.	7,227,113	8,157,725

Gas Made—Therms.

	1938.	1937.
Coal gas, including purchased	259,213,041	260,996,362
Carburetted water gas	22,567,198	25,754,918
Total	281,780,239	286,751,280

Statement of Gas Sales, Gas Used, and Gas Not Accounted for.

	1938.	1937.
	Therms.	Therms.
Gas sold—		
Consumer sales	246,099,800	249,274,721
Sundry processes	14,821,900	14,808,242
Correction for temperature and pressure	7,165,400	6,896,957
Total	268,087,100	270,979,920
Gas used on works, &c.	2,545,867	5,187,964
Quantity not accounted for	11,147,272	10,583,396

South Metropolitan Company's Accounts

Abnormal Weather Conditions Affect Sales of Gas

The quantity of gas sold by the South Metropolitan Gas Company during the year 1938 was 3·46% less than the amount sold in the preceding year, a decrease which the Directors say in their report is explained to a great extent by the abnormal mildness of the spring and autumn of 1938. In contrast with this, during the short cold spell before Christmas the daily output of gas was from 20% to 30% above the output in the corresponding week of 1937. Sales of gas for industry again show an increase. The number of consumers connected to the Company's mains has now reached 443,244, which represents an addition of 1,269 to the record of 1937.

The further and substantial increase in the cost of coal with which the Company is faced necessitates an increase of 0·35d. per therm in the price of gas, to take effect from the first reading or clearing of the meters after Jan. 15. As will be noted from the following figures, the return from coke and other by-products, although short of the high level of 1937, has made a satisfactory contribution to general revenue:

Residual Receipts.

——	1938.	1937.
	£	£
Coke	635,298	641,993
Breeze	5,959	4,809
Tar, &c.	107,440	145,018
Ammonia, &c.	26,698	24,977
Total	£775,395	£816,797

There is an interesting reminder in the report that in November the Company's co-partnership will attain its Jubilee. The Directors are glad to be in a position to state that the combined figure for time lost by reason of sickness and accident has continued at the low level of only 2·66%.

A paragraph records the severing of a link with the past by the fact that developments at East Greenwich and other stations have rendered the retention of the Bankside Works unnecessary, and therefore uneconomic, and the Company's property there was sold by auction last June.

Dividend Maintained.

After providing for the service of the debenture and preference stocks, the balance of profit—£218,242—allows of a final dividend on the ordinary stock of 3%, making 5½% for the year, and at the Annual Meeting of stockholders to-day the Directors will recommend the declaration of this dividend, which is at the same rate as for the years 1936 and 1937. Under the provisions of the Gas Undertakings Act, 1929, £600,000 of 3¼% debenture stock, redeemable 1963-68, was issued last February at the net price of 100½%. The proceeds have enabled the temporary loan from the Company's bankers of £670,000, which was raised for the financing of hire-purchase transactions, to be cleared.

Glancing at the accounts, it is noted that during the twelve months there has been no addition to the total expenditure on capital account, credits (less expenditure) having resulted in a net reduction of £100,919. The rise or fall in the main items on Revenue Account will be gathered from the accompanying table.

Revenue Account.

RECEIPTS.

——	1938.	1937.
	£	£
Gas	2,642,871	2,672,544
Rentals of meters, stoves, and fittings	442,883	438,900
By-Products	775,395	816,797
Rents and transfer fees	7,738	8,110
Total	£3,868,887	£3,936,351

EXPENDITURE.

——	1938.	1937.
	£	£
Manufacture of gas	1,853,004	1,884,034
Distribution	925,896	974,330
Public lamps, labour, and materials	32,038	30,143
Co-partnership fund	33,549	33,549
Rents, rates, and taxes	121,409	116,795
Management	185,103	186,188
Miscellaneous	156,752	151,063
Total expenditure	£3,307,751	£3,376,102
Balance to net revenue	£561,136	£560,249

It will be noted from these figures that though the net revenue shows a small increase of £887 over the balance of the previous year, this was because the decrease in receipts was slightly less than the decrease in expenditure. As already remarked, the quantity of gas sold was 3·46% less than the amount sold in the preceding year, and this is reflected in the cost of gas manufacture, which the figures show to be some £31,000 down. The receipts for gas have fallen off to an extent very slightly less than the decrease in cost of its manufacture. Residual receipts are down by about £41,000; by far the biggest drop appearing under the heading of "Tar, &c.," where a decrease of some £38,000 is shown when comparison is made with the figures for the previous year. With the exception of the items of manufacture and distribution, the figures show no important change on the present occasion. The cost of distribution in 1938 was nearly £50,000 less than was the case in the preceding year.

The figures relating to gas made and sold are reproduced below.

Gas Made and Sold.

——	1938.	1937.
	Therms.	Therms.
Quantity made and bought	78,229,282	80,865,052
Quantity charged	74,343,511	77,144,636
Correction for temperature and pressure	2,399,446	2,345,321
Total sold	76,742,957	79,489,957
Used on works	1,328,749	1,387,361
Quantity accounted for	78,071,706	80,877,318
Balance	157,576	12,266

It may be pointed out that the quantity of gas made and bought includes 59,639 therms purchased from H.M. Fuel Research Station, while the quantity charged includes 3,016,234 therms sold to the South Suburban Gas Company, the latter figure being about 66,000 therms up for the year.

Hire-Purchase Agreements.

The balance-sheet shows cash at bankers and in hand £72,206, stores in hand £680,000, accounts due to the Company £664,779, and the following balances outstanding: South Suburban Gas Company, £19,591; hire-purchase fittings, less reserves, £570,161. The latter figure is about £80,000 more than was the case a year ago, and it affords eloquent testimony to the popularity of a system that, rightly utilized (as is the fact with an industry supplying a commodity necessary to the well-being and economy of the home), has at the present day a rightful place in the scheme of things. Practically the whole of the amounts in the Reserve Fund and Renewal Fund are invested. These investments appear in the balance-sheet at £511,830, whereas the market value when the accounts were drawn up is stated as £564,728.

New Specification for Pipe Fittings

With the publication of B.S. 143/1938, Malleable Cast Iron and Cast Copper Alloy Pipe Fittings, the British Standards Institution has completed the revision of the specifications for long sweep malleable iron pipe fittings (B.S. 143/1922) and cast iron pipe fittings (short turn type; B.S. 154/1922), the two specifications now being incorporated in one publication.

The general scope of the new specification has been amended by the inclusion of cast copper alloy pipe fittings and the exclusion of soft cast iron pipe fittings that are to be the subject of a separate specification. Other amendments are the inclusion of additional patterns, the extension of the range of nominal sizes from 4 in. to 6 in. maximum, and the inclusion of a section on testing malleability and porosity. In addition the form of reinforcement of the ends of fittings is not now limited to a band, and alternative sizes are permitted within certain limiting dimensions.

The dimensions of the screwed ends of fittings have been incorporated in one table, making it possible to use simple illustrations to show the main dimensions necessary for each type of fitting, while the subject-matter has been arranged to give ready cross reference between the tables and diagrams to which they refer.

Copies of this British Standard are obtainable from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1, price 3s. 6d. (3s. 8d. post free).

Fine Example of "Period" Design

IN

Oldham's New Showrooms

Very attractive new showroom premises were opened in the Market Place, Oldham, on Jan. 31, the ceremony being performed by Councillor F. Tweedale, J.P., Chairman of the Gas Committee.

FOR several years the Oldham Gas Committee have been on the lookout for new premises, and finally secured the present site in the Market Place. It has a frontage of 36 ft. to the Market Place and a depth of 47 ft. The front has been designed in the Tudor period style and the building is of fireproof construction throughout, being built of brickwork with concrete floors on a steel framework and the roof covered with Westmorland green slates.

The premises consist of a basement, ground floor, first and second floors, connected by a spacious oak staircase. A passenger lift, to carry five persons, communicating with each floor, has been installed.

The basement, which is finished in black and white tiling, is to be used for periodical bargain sales and for the exhibition of large-scale apparatus. A staff cloakroom and a heating chamber with a gas boiler for warming the premises are situated on this floor.

The ground and first floors are the main showrooms. Each floor is panelled in Austrian oak to a height of 7 ft. 6 in., provision being made for interchanging the gas and coke fires, &c. Ventilating flues have been built into the walls behind the panelling, which discharge above the roof and carry away all exhaust gas fumes. Ventilating flues have also been provided in the same way to all the main lighting fittings.

There are spacious windows on either side of the front entrance doors in one of which a water connexion has been fixed for use in any exhibition requiring running water. The water heating display is in black marble.

On the ground floor there is a room to be used for the receipt and unpacking of goods with direct communication to the street behind and also a space for the use of the showroom staff for clerical purposes.

On the first floor a private office is provided for the use of the Manager, and on the second floor there is a demonstration theatre with comfortable seating for about 60 people. On the platform are a gas cooker, refrigerator, cupboards, sink, &c., with a small kitchen adjoining. This theatre is also panelled in Austrian oak, and there is a very handsome ceiling light.

Wall Frescoes.

All the main floors are covered with rubber flooring, and on the ground and first floors there are frescoes illustrating the development of gas manufacture:

GROUND FLOOR.—On the right is a large panel showing a colliery connected by railway with a modern gas producing plant with mills and industries in the background. Opposite are two panels showing a modern gas producing plant in more detail—a retort house and coke screening and washing plant; and between is an historical panel showing an early gas producing plant and two early gas containers.

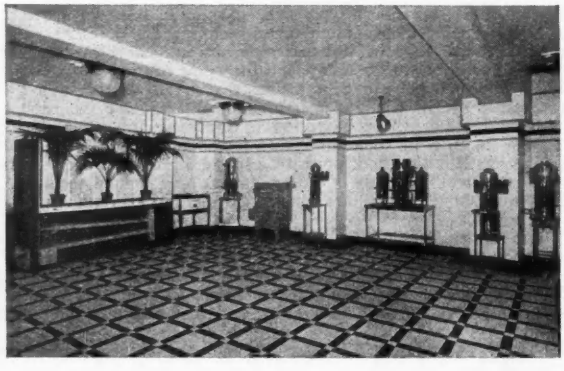
FIRST FLOOR.—Here are six panels, three of which are historical. The first shows Murdoch's early production of gas in his own house at Redruth, Cornwall, in 1792; the second, the erection of street lamps in Queen Victoria Street, London, in 1879; and the third, workmen erecting gas fires and cookers in 1884. The three panels on the opposite wall show modern gas appliances in use.

The coloured panels in the lift doors are descriptive of ancient methods of lighting, such as the candle, the brazier, the flambeau, and the lantern, while those in the doors to the demonstration theatre depict cooked foods which were in favour many years ago.

The whole of the building and constructional work was designed under the direction of the late Mr. J. Ashurst, M.Inst.C.E., Borough Engineer and Surveyor, by Mr. R. Worcester, his Architectural Assistant, who has supervised the erection to the requirements of Mr. Ernest Parry, the Commercial Manager of the Gas and Water Department, in co-operation with his technical staff.

Opening Ceremony.

Alderman F. LLOYD (Vice-Chairman of the Gas Committee) occupied the chair at the opening ceremony. He explained that the Committee gave much time and thought to the type of building which should be erected, and decided to strike an entirely new note. They felt that an important industrial town like Oldham ought to have a building which had dignity and beauty. He hoped all present would agree with him in thinking they had not been entirely unsuccessful and in expecting the cost in time



Basement Showroom.

Main Showroom.

and money would be amply justified by the business which would accrue.

Councillor F. TWEEDALE said that in Oldham the percentage of gas appliances to consumers was one of the highest in this country. More than 100,000 were in use. They did not accept the idea that the Gas Industry was diminishing through killing competition and that their hours as an undertaking were numbered. Nationally it was progressive and full of vitality; the Committee were doing their best to maintain locally the high standard that had been set up in the Industry as a whole. During the last few years profits had been made consistently and the price had been reduced just as consistently. The opening of these new showrooms was part of their progressive policy. They claimed to have made a notable addition to the buildings in Oldham. They had been fortunate in securing one of the best sites in the town, and the cost would be provided out of the Department's reserve without affecting rates or charges.

Councillor Tweedale was accorded a vote of thanks on the proposal of the Mayor, Alderman J. BANNON, J.P., seconded by Councillor J. F. WATERHOUSE.

Croydon Company Open New Showrooms at Coulsdon

New branch showrooms in a prominent position on the main Brighton Road were opened last week by the Croydon Gas Company for their consumers in the large and rapidly expanding area of Coulsdon.

EVER attentive to the needs of their consumers, the Croydon Gas Company have for many years pursued a policy of extending their showroom facilities in a manner commensurate with the development of their area of supply. With this in view the Company opened last week a further service centre for the convenience of some 20,000 of their consumers in the rapidly growing district of Couldson. Prior to the opening of this showroom, Coulsdon consumers had to travel two miles or so to the nearest branch of the Company at Purley.

The new premises occupy a prominent site on the main Brighton Road, adjacent to the Public Library, and as such provide in their up-to-date lines and pleasing conception a fine advertisement for the progressiveness of the Gas Industry to many thousands of motorists who in their passage along this busy highway may, perhaps, allow their eyes to wander for a few seconds from the wheel as they go by.

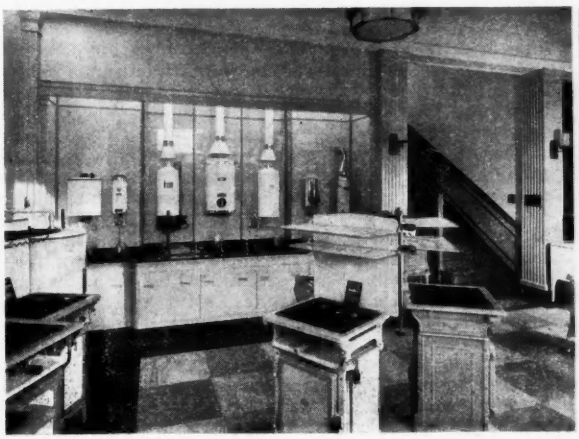
Flanked on either side by lock-up shops, the showroom radiates a cheerful welcome to the passer-by, and its large windows on each side of the main door give an uninterrupted view of the bright and pleasing interior. Above the windows is a series of Sugg's "Arcade" lamps on distance control, which brightly illuminate the façade by night.

Pleasing Decoration Scheme.

Inside, the impression of brightness is enhanced by the pleasing decoration scheme of green and cream offset by very attractive walnut counter and panelling. The floor is covered in squares of "streaked" green rubber, while the chairs are upholstered in a similar coloured material to match the curtains of the rear windows. Modern lighting fittings are arranged in the form of brackets on the walls and central pendants, while subsidiary lighting is provided by means of concealed strip lighting over the windows and water heating display and along the ceiling above the side walls. There are also ventilators at ceiling level.

The appliances are tastefully displayed in appropriate settings, most of them being, of course, "alive," while a coke fire forms a cosy centre-piece on one wall. The water heating display is noteworthy, consisting of a varied range of appliances set in a special recess and provided with stainless steel draining troughs. In addition to the appliances which actually discharge directly into this trough, further taps are connected to multi-point and storage apparatus. These taps are suitably "labelled" by means of ingenious little blocks of green moulded plastic material standing beside them, on which the names of the appliances to which they are connected are written.

On the other side of the showroom, at the back, is the counter,



panelled in walnut, with a roomy area behind for the showroom attendants. There is a clock fitted flush with the wall above a corner panel fire, while another useful piece of equipment is a walnut cabinet divided up into a large number of little shelves to accommodate all the various leaflets which refer to appliances in the showroom.

As a working exhibit is a Potterton's "Rex" gas-fired boiler in a recess beside the staircase. This boiler looks after the central heating of the demonstration room upstairs, and in its pleasing mottled enamel finish provides a good example of the cleanliness and convenience of gas for this purpose. It is, of course, completely automatic in operation.

Demonstration Theatre.

Facing the main door is the staircase to the demonstration theatre. This room seats upwards of a hundred persons, and is equipped with an up-to-date "model kitchen" on the platform, complete with built-in refrigerator and cupboards. Hot water for washing up and culinary purposes is supplied from the storage heater which forms part of the water heating display in the showroom below. The platform is floodlighted from concealed sources above, while the theatre itself is illuminated by wall brackets and ceiling ventilating lamps.

It takes but a very few moments to pull down the blinds and drop a screen at the back of the platform to transform the theatre for the purpose of film shows. On either side of the platform are ante-rooms for the use of the demonstrating staff. There is a wide iron staircase from the theatre to the yard at the rear of the premises for emergency use.

Behind the showroom downstairs are cloakrooms for the staff and a small stock-room. Particularly noteworthy in the latter is the fitting work, where the meters, governor, and dozens of gas and water pipes are compactly accommodated on one wall—all running away in neat parallel lines to their different destinations. A really remarkable example of the fitter's art. Direct access to the stock-room is possible from the area behind the counter.

There is a large yard behind the building, while the remainder of the upper floor, which extends the full width of the building above the lock-up shops, is occupied by the residence of the Company's representative who lives on the premises and is always available for dealing with emergency calls. The main entrance to this flat is by means of an external staircase direct from the yard; there is an additional entrance from the landing outside the demonstration theatre.

The building was designed and built by the Nautilus Company.

The opening of this new service centre was not marked by any official ceremony. There were, however, sent out to some 8,000 consumers in the area a nicely worded card announcing the opening of the premises and extending an invitation to attend the cookery demonstrations and film shows which marked the first week.

The showrooms created an enormous amount of local interest, and consumers seem genuinely grateful to the Company for bringing these facilities into the district. Attendances at the demonstrations throughout the week were remarkable, and on several occasions more than the total capacity of the theatre actually had regretfully to be turned away—evidence, if such be needed, that consumers really do appreciate gas undertakings' efforts to interest and assist them.

Long-Range Researches on Coke Structure

THE Gas Industry as a collective body—whatever may be the reaction of individuals—needs no persuasion of the value of long-range research. The work at Leeds University carried out under the ægis of The Institution of Gas Engineers bears ample evidence of that fact. In our daily work we perhaps a little resemble Isaac Newton, who pictured himself as a boy finding pebbles on the seashore, while the great ocean of truth lay all undiscovered before him. Who can tell what discoveries will be made by voyages in search of truth? Maybe, we shall suffer shipwreck and return home disillusioned to put our noses again to the daily grindstone of well-established methods. Maybe, we shall return with rich argosies gathered on the shores of trackless seas. A modern writer, Eden Philpotts, has well capped Newton's saying. "The universe," he says, "is full of magical things patiently waiting for our wits to grow sharper." So the Gas Industry, being well content to sail its argosy hopefully in search of gaseous discoveries, will not grudge the coke men their little argosy too.

The captain of the coke research argosy we have in mind at the moment is Professor Riley, whose work on the structure of coke and of carbons generally is now becoming well known, even if not universally understood. Professor Riley has lately brought the account of his researches up to date in the Jubilee Memorial Lecture under the auspices of the Society of Chemical Industry. It is worth while pausing a moment in our task of making and distributing gas to consider the results of the notable work being carried on at Newcastle.

Based on Graphite Crystal.

The structure of coke and of most carbons is based on the graphite crystal. In this, the carbon atoms are arranged in flat planes and are situated at the corners of vicinal hexagons. If a number of six-sided regular figures be drawn in such a way that each side is shared in common between neighbouring hexagons, a fair picture will be obtained of a single graphite plane. Naturally, the carbon atoms on the outside of the figure, being joined to only two other carbon atoms instead of three, will be more easily attacked than the more fully saturated carbon atoms. The distance between neighbouring atoms in this plane is 1.415 Å. Beneath or above this plane and parallel to it are other planes, usually 4 or 5 in number, and in the graphite crystal the distance between adjacent planes is 3.35 Å. Thus investigators have mapped the structure of the graphite crystal by means of X-rays.

Graphite is now found to have quite remarkable chemical properties. It behaves as an electro-positive metallic radical, under proper conditions forming "salts" such as sulphates, nitrates, chromates, perchlorates, selenates, phosphates, arsenates, fluorides, bromides, and sulphides. These salts are formed by penetration of the anions between the hexagon layer planes, increasing their distance apart from 3.35 Å to nearly 8 Å. Curiously enough, graphite is also found to be weakly electro-negative, since it can form compounds with the strongly electropositive alkali metals, sodium, potassium, rubidium, and cæsium at a temperature of 400° C., having the general composition $(C_8K)_n$ and $(C_{16}K)_n$. It is not a little surprising that such chemical reactions should occur with an inert material like coke. The alkali metals, like the acid radicals, also enter between the hexagon planes and increase their distance apart. Compounds of the type $(C_8K)_n$ possess alternate layer planes of carbon atoms and alkali atoms; in compounds of the type $(C_{16}K)_n$ each alternate layer of alkali atoms has been eliminated.

Finally, we have graphitic oxide, a compound of the type $(C_3O)_n$ which is formed by oxidation of graphite with a mixture of concentrated nitric and sulphuric acids with potassium chlorate, again formed by penetration, this time of oxygen between the layer planes. This compound is important in the story because it proves the graphitic nature of many so-called amorphous carbons. It can, for example, be prepared from CO—carbon, and the other two types of compounds to which reference has been made—*e.g.*, C_8K and CF can be prepared from soot. This interstitial penetration of oxygen into the carbon lattice plays an important part in combustion and has provided a means of studying graphitization produced by carbonization and has enriched our knowledge of the carbonization process, in particular by showing the theoretical significance of the critical temperature of 700° C.

This disquisition will enable those readers with chemical training to see clearly the structure of graphite. Although reference has been made to "the graphitic nature of many amorphous carbons" it is not to be assumed that amorphous carbon has the identical structure of graphite. The size and shape of the crystallites, for example, must be known, for this will influence the number of unsaturated border atoms present as well as their electronic nature. X-ray analysis has shown that when the crystallites are very small, their hexagon layer planes are parallel to each other but are not otherwise arranged in any definite manner with respect to each other. In this condition they are probably more reactive. The importance of this is that coke made at lower temperatures probably tends to consist more of these minute crystallites,

though, as will be seen, the carbon is combined also with other elements.

It has long been known that at about 700° C. coke passes through a critical stage; without there being any very definite reason that could be assigned to the change, this temperature became recognized experimentally as important. So long ago as 1910, for example, Burgess and Wheeler noted that "there is a well-marked decomposition point lying between 700° and 800° C. which corresponds with a marked increase in the quantity of hydrogen evolved," and they later drew the conclusion that "coal contains a compound which undergoes decomposition at temperatures above 700° C., and yields hydrogen as the principal gaseous product." They termed this "the critical period of decomposition," and considered that coal contained two types of compounds, one yielding hydrogen and the other (which decomposed at lower temperatures) paraffins. It is now recognized, as Professor Riley has pointed out, that in many other respects 700° C. is a critical temperature. The character of the volatile matter evolved during carbonization changes abruptly at about 700° C. and above this temperature is principally hydrogen; the carbonaceous residue becomes an electrical conductor about this temperature; the absorptive capacity of carbons increases up to 700° C. and thereafter declines; the curve relating ignition temperature with carbonization temperature shows a very pronounced increase in slope (indicative of reduced ignitability) at 700° C.; and the yield of mellitic acid obtained from various carbons by controlled wet oxidation increases rapidly with carbonization temperature up to 700° C. and thereafter only slightly, indicating that aromatization (*i.e.*, hexagon formation) is nearly complete at this temperature.

What is the cause of the existence of this critical temperature? Professor Riley's work shows that it is due to the condition of the crystal structure of the carbon and of the distribution of the organic matter associated with it, and it appears that he does not agree that there is a well-defined decomposition point at 700° C. of any defined compound. In the initial stages of thermal decomposition of an organic compound highly condensed aromatic molecules are formed which arrange themselves in a graphite-layered lattice. As the temperature rises, graphite nuclei are formed surrounded by complex hydrocarbon rings and chains which are chemically bound round the borders of the hexagon planes of the graphite nuclei. This is the condition of coke at, for example, 400° or 500° C. As carbonization proceeds, the disordered rings and chains decompose further, some of the carbon atoms being lost as volatile matter, the remainder attaching themselves to layer planes, thus causing lateral growth of the crystallites. At 700° C., this lateral growth becomes much less pronounced, because the "disordered molecules" that have been attached to the outer carbon atoms have virtually finished their decomposition. It appears probable that at 700° C. an appreciable number of the border carbon atoms in coke are unattached to extraneous atoms, and this unsaturation is probably connected with the abrupt changes—*e.g.*, in electrical conductivity—at this temperature.

The amount of the disordered border-infesting molecules left at 700° C. is probably (according to chemical analysis) so small that further lateral growth of the crystallites is impossible. True thermal re-crystallation does not occur till much higher temperatures, approximating to 1,300° C., which, of course, is never reached either in the coke oven or gas retort. An interesting fact disclosed by recent work is that whereas the hexagon planes of the coke crystallite may grow laterally by decomposition of the "disordered molecules" which move round the graphite crystallites like jackals round a lion's feast, the crystals do not grow in the direction at right angles to the planes—*i.e.*, the number of planes in each crystal appears to be a constant average of four or five, and does not increase during carbonization, due to the insufficiency of the energy of vibration at the temperatures considered to promote the growth of additional planes.

London and Southern District Juniors

Visit to British Oxygen Company's Works

A large gathering of members of the London and Southern District Junior Gas Association spent a most interesting afternoon on Feb. 1 at the Cricklewood Works of the British Oxygen Company, Ltd.

After a welcome by Mr. R. E. Doré (Assistant Manager), the visitors proceeded outside to watch a demonstration of oxy-acetylene cutting of cast-iron and steel billets; this was followed by a demonstration of boring through several inches of metal by means of a high-pressure blast of oxygen after preliminary heating of the surface with an oxy-acetylene flame. This method of oxy-acetylene cutting with a hand cutter is an important outlet for the Company's products, and is used chiefly, of course, for the scrap cutting of iron and steel.

The visitors subsequently repaired to the demonstration room where they witnessed a large number of different cutting and welding processes. Mr. F. Clark, who is in charge of instruction and demonstration work, explained the various operations on the benches, all of which were proceeding continuously, so that the visitors could go from one to another demonstration as they pleased. Precision cutting with the oxygen machine showed how intricate shapes can be cut from steel plate up to 14 in. thick—either "singles" or repetition work for mass-production. This process is widely used to replace forgings and castings, and has many advantages in the fabrication of steel parts in conjunction with welding.

The majority of the demonstrations were devoted to different welding processes, this being one of the most important applications of oxygen in combination with acetylene—the latter either compressed in cylinders (dissolved acetylene) or derived from a low-pressure acetylene generating plant. Oxy-acetylene welding, brazing, or heating is used in practically every important metal industry, either for production or for maintenance and repair. Demonstrations were given of welding plates, pipes, and cast-iron parts, the last-named being preheated—also the welding of a split in an inaccessible part of a main by means of removing (with the oxy-acetylene cutter) a portion of the pipe, which is subsequently welded back into place again, and approaching the previously inaccessible point through the hole thus cut out. The building up of worn tools and mechanical parts by the deposition of extremely hard metal was also shown.

The members were then treated to a series of most entertaining "conjuring tricks" with liquid oxygen. On being poured out of its container at a temperature of about 180° below zero C. the liquid immediately commences to boil vigorously. It was shown how it would drive a toy steam engine without the necessity for any fire under the boiler; how it would freeze grapes in a few seconds so that they would break like glass marbles when dropped on the stone floor; how a rubber tube after a few moments' immersion could be broken into pieces like macaroni; and how metals immersed for a while shrink to such an extent that a cylinder lining could be dropped easily into position, instead of requiring immense pressure.

The various gases manufactured by the British Oxygen Company are produced in forty-one different factories in all parts of the British Isles and Northern Ireland, and in addition to those used for welding and cutting work, many gas undertakings carry supplies of their medical gases with emergency squads and in ambulance stations for resuscitation and for self-contained breathing apparatus. May we even mention Neon signs, which are finding their place nowadays among gas advertising? This gas, too, is manufactured by the B.O.C.

By kind invitation of the Company, the Association were entertained at tea in the very fine lecture hall, where they subsequently witnessed a film showing the bronze welding of a spun-cast gas main in Australia. The close-ups of the process showed details which are difficult to observe with the naked eye. It was also demonstrated in the film how a mistake in the cutting of two ends of pipe at a bend, causing a considerable gap at the join, was easily rectified by simply welding in a piece of metal.

Mr. DORE expressed the hope that their visit would help the members in some of their difficulties, and referred to the firm's technical service which was always at the disposal of those who had welding or cutting problems.

The PRESIDENT (Mr. S. C. Waldock, of the Gas Light and Coke Company) voiced the thanks of the members for a most enjoyable afternoon. He also thanked the demonstrators who had done so much to make their visit interesting. Mr. H. MOYS (Commercial), seconding the vote of thanks, spoke of the value of welding work to the Gas Engineer; it got them out of many a difficulty when castings broke down.

The Conjoint Conference of Public Utility Associations

Seventh Annual General Meeting

The Seventh Annual General Meeting of the Conjoint Conference of Public Utility Associations was held at Gas Industry House on Thursday, Jan. 26—Sir DAVID MILNE-WATSON, Bart., LL.D., D.L. (Vice-President), presiding at the outset.

The Minutes of the Sixth Annual Meeting, held on Jan. 27, 1938, having been circulated, were taken as read and were confirmed and signed.

The list of representatives appointed and nominated by each constituent member of the Conference to serve upon the Council for the ensuing year was thereafter read out.

The New President.

Mr. WILLIAM CASH, F.C.A., J.P., said that in the absence of the Chairman of the Council, Mr. W. B. Woodhouse, the honour fell upon him to propose that Lord Falmouth should be nominated President for the ensuing year. As one of their Vice-Presidents, Lord Falmouth had been most helpful to the Conference in the past, and they all knew of the valuable service he had rendered them from time to time as a member of the Upper House. Mr. Cash pointed out that Lord Falmouth was not only a member of the Institution of Mechanical Engineers and served on a number of public bodies and committees, but he was also actively engaged in business. Mr. Cash concluded by paying a tribute to Lord Mount Temple, who had been President since the Conference was constituted in 1932, saying how much indebted they were to him for the work he had undertaken on their behalf. Mr. Cash then formally proposed the election of Lord Falmouth.

Mr. H. C. SMITH, seconding the motion, mentioned that Lord Falmouth was also a member of the Fuel Research Board, and it had been Mr. Smith's privilege to see the value of the work he had done on that Board.

The resolution was carried unanimously, and Lord FALMOUTH thereafter took the chair. He thanked the members for the great honour they had done him in electing him President, and assured them he would do all he could to help forward the interests of their important Conference.

Election of Vice-Presidents.

On the proposition of the PRESIDENT, seconded by Mr. SCOTT MONCRIEFF, the following were elected Vice-Presidents of the Conference—namely,

Sir David Milne-Watson.
Mr. William Cash.
Lord Pentland.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then moved the adoption of the Annual Report and Accounts for the year ended Dec. 31, 1938. In doing so he said:

I must thank you very much for electing me your President. For some years I have had the privilege of being one of your three Vice-Presidents, and I do feel that it is indeed an honour to become President of your important Association.

As a President, of course, one can have no preference, and I think I may claim to be fairly catholic in my tastes. I must admit that my first interest is electrical, but when I was Chairman of the Oil from Coal Committee I learnt how essential is a vigorous Gas Industry for the well-being of this country, and as a member of the River Lea Catchment Board I also come constantly in contact with the important section of our Conference which represents the water interests. If I have not a wife in every port, at least I can claim to have had a finger in our three pies.

I assure you I will do all I can to help on the work of this important body, but I feel that you have set me a hard task in following the footsteps of our retiring President, Lord Mount Temple.

Lord Mount Temple took office in 1933 and was the first occupant of the post of President of the Conference created by the Constitution adopted in 1932. At that time the Conference had just emerged from what has been described as its "chrysalis" stage, for though it had been in existence since 1924, had built up a considerable organization, and had done a great deal of useful work, it was more or less informal and experimental in character. It proved its success and value as a means of co-operating in matters of common interest, however, and this led to a general recognition that it should assume a more formal and permanent shape. The Constitution under which we now exist was the result.

Increased Strength and Influence.

It will not, I think, be denied by anyone that during the years which have since gone by the Conference has increased in strength and influence. And it has been able greatly to extend its sphere of usefulness to the benefit of its constituent members.

In these developments Lord Mount Temple played a distinguished part, bringing to the task a ripe experience of Parliamentary and public affairs, and the special knowledge gained as the result of five years' service as Minister of Transport. Not only did he preside regularly over the Annual General Meetings of the Conference when his speeches were always full of interest, but outside, and in particular in the House of Lords, he on several occasions championed the interests of the Public Utilities. All of us are most grateful to him for the services which he rendered to us.

Gas, electricity, and water are three of the most important public services that exist to-day. Indeed it is difficult to imagine how the country could possibly carry on without their help.

Our constituent members represent a capital expenditure of well over £1,000,000,000. We consume upwards of 35,000,000 tons of coal per annum. We have nearly 300,000 miles of mains laid, and we employ over 200,000 men directly in our undertakings. These figures give one some idea of the vast size of our businesses.

Now it is often stated that sheltered industries are apt to become sleepy after a time and are little disposed to adopt new ideas. But this is certainly not true in the case of either water, gas, or electricity.

Take water. I admit we are constantly told on the hoardings that beer is best, and perhaps it is true for some purposes, yet our oldest industry—water—still survives and, what is more, seems to be an increasingly large constituent part of that same beer. The wonderful purity of our water supplies, in spite of the fact that we are very closely packed upon this island, and the elasticity shown by the water industry in the way in which it has been able to keep pace with the great increase in demand, are evidence as to how very alive the industry is to modern requirements. But no matter how alive our industry is you cannot easily increase the Catchment Area from which you draw your supplies. That is your great difficulty. The appointment by Parliament of the Central Advisory Water Committee to go into this whole question and try to find a fair solution is a very important event in the history of water undertakings.

And then gas and electricity. Very great developments have taken place in gas and electrical supply in recent years. One of the outstanding achievements is the reduction in the amount of coal consumed for electrical unit generation since the war. It has saved the nation many hundreds of thousands of pounds per annum. And the steady improvement in the efficiency of gas-making is also of great advantage to the public. And if certain developments, which are now in the experimental stage in this country and abroad, in regard to the complete gasification of coal, are successful, still further benefits may arise.

The sale of electricity units has, of course, shown a phenomenal expansion since the war. Its much older stable companion, gas, cannot be expected to show the same ratio of

expansion as its younger competitor, but even gas since the war has shown an increase of some 50% in its sales, and I think you will agree that that is a remarkable achievement for so old-established an industry.

One more example. The capacity that both the gas and electrical industries have shown in meeting the huge extra demand made on them during the recent cold snap was very striking. This shows how efficiently these industries are conducted, and how well they are carrying out their public responsibilities.

Those who say that our sheltered industries of water, gas, and electricity are dormant are speaking through their hats. Every advantage of modern science and scientific research is being used still further to improve the services for the benefit of the public, and in many cases the results are very remarkable.

But I am getting into matters which, though they are very interesting, are, I fear, most of them outside the immediate sphere of our Conference.

Common Characteristics.

Though water, gas, and electricity all differ in fundamental ways, we must never forget that in the matter of their supply they have certain characteristics in common. We are all alike in that we are established for carrying on essential public services, generally under some parliamentary statute. We are also alike in that our supply radiates from a central source, be it an electricity generating station, a gas, or a water works. And we all have to transmit our supplies to consumers who are sometimes dotted over a very wide area; we are all alike, too, in that our consumers, all of them, consider it their right to have a connexion to our supplies as and when they want it, and a supply at minimum rates.

In carrying out our responsibilities, we come in contact with many outside organizations and local authorities, public bodies and Government Departments. And one of the great difficulties which we have to overcome is to convince these public authorities that it is just as important for the public that our members should carry out their duties, as it is for them to carry out theirs. There has been a tendency to squeeze our members in the past, and in no way has this Conference justified itself more than in its efforts to secure for its members fair treatment in their dealings with Highway and other authorities. Indeed, it was this very question which led to the original formation of the Conference in 1924. As you know, the British Water Works Association were then experiencing difficulties in negotiations with the L.C.C. A conference was called by them and so the foundations were laid of our organization.

Since then a formidable body of precedents has been built up, valuable to industrial undertakings and to Public Utilities generally, and, I venture to claim, equally valuable to the self-same local authorities themselves. Unfortunately, even now it is impossible to reach an agreement with Highway Authorities whereby the necessity for contesting individual cases can be avoided, but we hope this difficulty may be overcome in the future, for with the coming into operation of the Trunk Roads Act, the whole question has, as the Report of your Committee shows, entered a new phase, and is shortly to be examined and reported on by a Joint Select Committee of both Houses. Evidence is being prepared by the Conference for submission to this select committee, and we are hopeful of the outcome. An outline of our case appears in the Report, which I think will be generally admitted is very strong.

The Coal Position.

One matter has been causing great anxiety to all Public Utility undertakings, especially those of gas and electricity. That is the rise in the cost of operations, which has been going on now steadily for a considerable time past. The chief item bringing about this rise is, of course, the cost of coal. As all such undertakings, with very few exceptions, use coal, any increase in cost of this principal raw material cannot help reacting on the cost of the whole undertaking.

The Coal Mines Act of 1930 may be considered as the beginning of a change in the mining position. The declared object of this Act was to improve the price of coal. The coal industry obviously cannot be allowed to go bankrupt, nor can the miners be given an unfair wage. We who live in more or less sheltered industries sympathize with the coal industry's great difficulties, but when Parliament gives great marketing power to an industry, the public should be assured in some way that it is being as efficiently conducted as is possible.

This Act has now been followed by the Act of 1938. In the earlier Act all the emphasis was directed to the question of quotas. Now it has come round half a circle and concentrated itself in Marketing Schemes.

Great efforts were made by this Conference to improve the 1938 Act during its passage through the House, and we are most grateful for the help we received from many quarters. Our energies are now directed to making the best use we can of this measure, and we are endeavouring to secure that those representing consumers on the Committee of Investigation, set up under the Act, shall be fully representative.

Speaking for myself, I think that the policy of manning committees of investigation by interested parties is a very doubtful one. There should be, in my opinion, an independent tribunal and the interested parties should give evidence before it, if a proper result is to be arrived at. As things are, each member of the Committee now comes to it with his opinions already formed, and his vote is almost a foregone conclusion, and very often the best witnesses are members of the tribunal and so cannot give evidence as they should to support their own cases. I am sure this is a bad policy, and only too often does Parliament set up this class of Committee.

The Railways.

Another matter of great importance to our industry is the appeal of the railways for a square deal. The railways are a great public utility enjoying special privileges in the same way as ourselves, and in return having special responsibilities, and, as we know, they are at the moment in a very serious case.

I think it is obvious to all reasonably-minded people that the railways are absolutely essential to the country, and to nobody are they more so than to ourselves, who consume so many million tons of coal per annum, the great majority of which must be rail-borne. Clearly no road transport can possibly take their place, and they must continue to exist. That being so, surely the railways must stand on their own feet, for we cannot possibly carry them on our backs as a huge subsidized organization, which is the only other alternative. At present farming wants a subsidy, shipping wants a subsidy, and so on! We cannot all be pensioners on the unhappy taxpayer.

The rigid regulations under which railways operate were all very well as long as they had no competition, but now the situation is completely changed and road traffic, by taking the cream off the milk, has made the railways' position extremely difficult.

I, personally, feel that the recent statement in the Press that the railways are willing to submit to the Railway and Canals Commission's claim of unfair treatment made by traders will help greatly to relieve the anxiety felt by many of a possible increase in existing rates. It is to be hoped that the negotiations now in progress will be concluded in a manner to give reasonable protection to the traders and justice to the railways.

There is one other matter of exceptional interest on which I should like to say a few words, and that is Air Raid Precautions. It is a sad commentary on the times through which we are passing that we should have to mention a matter of this character this afternoon.

In time of war, however, the supplies which we furnish will be of vital importance to the safety of the country. But the very nature of our activities makes them vulnerable to air attack. Each of our three industries has its own peculiar difficulties to be overcome. Speaking generally, I am very glad that agreement has now been reached between the Government and the utilities as to the special defence precautions which are to be taken. I think we may further claim that our members have shown a proper spirit of patriotism, which might well be followed by others, in agreeing to shoulder 50% of the additional cost to be incurred in connexion with this special work.

There are many other important matters which I should like to have touched on if time had permitted, but we have

another meeting immediately following this, and so I must close. A full account of our activities during the last twelve months is recorded in our Annual Report.

Sir DAVID MILNE-WATSON, seconding the adoption of the Report and Accounts, said they were greatly indebted to their President, as they were also to Lord Mount Temple for his services in the past. In the latter's place they now had a very eminent gentleman whom he knew would carry on the traditions of the Conference. Lord Falmouth had touched upon their activities, and it was not necessary for Sir David to add to what he had said. He would, however, just refer to the coal position, which was of great concern to them. The present state of affairs was definitely detrimental to two of the interests represented by the Conference—namely, gas and electricity. Both of them had had to raise their prices recently by reason of being forced to pay abnormally high rates for their coal in addition to difficulties with regard to selection of quality. This was a very serious matter for the public because gas and electricity were absolutely essential in the world they lived in to-day. They had a rôle which was of the greatest importance in the well-being of the country. He knew that coal owners would tell them that it was much better to burn coal in its raw state; but nobody who really considered the welfare of the citizens of the country could believe that. In this country they suffered not only from grey skies but also the state of the atmosphere. It was impossible to abolish mists, but gas and electricity could ensure that these mists were not loaded up with the products of combustion of raw coal. Especially in the Gas Industry did they render valuable service by recovering by-products which in the event of war would be an absolutely vital necessity to the country. He hoped, therefore, that the public would not be led astray into thinking that it was better to use raw coal in place of gas and electricity. In conclusion, Sir David thanked Lord Falmouth again for his most interesting address, saying how much they appreciated the fact that he had accepted the office of President.

Mr. WILLIAM CASH, supporting the resolution, joined with Sir David Milne-Watson in saying that Lord Falmouth had already justified his position by giving them such an admirable Address. There was one further matter which was of considerable importance to them to-day, and that was the position of the railways. At a meeting of their Council that afternoon a resolution had been passed asking their secretaries to watch the position as it might develop and affect public utility undertakings and report with a view to taking action if necessary. It was a very difficult question indeed, particularly when it was appreciated that the heavy materials required by their industries must be moved over the railways.

The Report and Accounts were unanimously adopted.

Alternative Methods of High-Temperature Carbonization

by Dr. E. W. SMITH,
Technical Director, Woodall-Duckham Companies.

From a Paper before the Coke Oven Managers' Association (Northern Section).

After a general introduction, Dr. Smith went on to describe the various types of plant used in the Gas Industry and mentioned the circumstances to which they are respectively best suited. He then passed on to describe the relative economics of the various systems, and referred in particular to the influence of benzole recovery on the price at which the therm can be made.

The following section of the Paper gives comparative costs of gas production *ex* retort house under various conditions of operation and with different types of carbonizing plant.

The following gives comparative costs of gas production *ex* retort house under various conditions of operation and with different types of carbonizing plant.

The lowest calorific value of final gas considered in this study is 500 B.Th.U. per cu.ft. In certain cases figures are given for higher calorific value gas and the effect of benzole washing is considered. For the sake of comparison all plants are taken as working at equal load. No allowance is made for capital charges as the relatively small difference in capital charges per therm of gas with different types of plant will not modify the main conclusions. The capital *plus* maintenance charges of a carbonizing plant together usually amount to 0·45d. to 0·50d. per therm of gas made.

Table 1 summarizes the study of comparative costs of gas production. The basic data from which the net cost per therm is calculated is given in Tables 2 and 3.

Summary of Conclusions.

(1) From among the various conditions set out the cheapest gas per therm is produced in intermittent vertical chambers when producing a final calorific value of 525 B.Th.U. per cu.ft. after removal of benzole (see Column 1D).

(2) *Intermittent Vertical Chambers.*

(*a*) When no benzole is removed from the gas, *the higher the C.V. the cheaper the cost of gas per therm* (see Columns 1A, 1C, 1E).

(*b*) At a given final calorific value it is cheaper to remove benzole than to "steam" down despite the lower therms per ton (see Columns 1A and 1B, 1C and 1D).

(3) *Continuous Vertical Retorts.*

(*a*) When no benzole is removed from the gas, *the lower the C.V. the cheaper the cost of gas per therm* (see Columns 2A and 2C).

(*b*) At a given final calorific value it is cheaper to remove benzole than to steam down despite the lower therms per ton (see Columns 2A and 2B).

(4) At a final calorific value of 500 B.Th.U. *without* benzole removal, the order of cheapness is:

Continuous vertical retorts (2A).
Intermittent vertical chambers (1A).

(5) At a final calorific value of 500 B.Th.U. *with* benzole removal, the order of cheapness is:

Intermittent vertical chambers (1B).
Continuous vertical retorts (2B).

(6) At approximately 525 B.Th.U. *without* benzole removal, the order of cheapness is:

Continuous vertical retorts (2C).
Intermittent vertical chambers (1C).

(7) At 525 B.Th.U. *with* benzole removal or 550 B.Th.U. *without* benzole removal, the intermittent vertical chambers stand alone.

(8) With regard to the costs of gas production on coke ovens, they work out a little higher both with and without benzole removal than when making a high C.V. in intermittent vertical chambers (see Columns 4F, 4G, and 1D, 1E) although, of course, the final C.V. of the coke oven gas is higher than intermittent vertical chambers. Before town distribution blue water gas has to be added and thus the figures are not strictly comparable with those from intermittent vertical chambers and vertical retorts. Blue water gas usually costs more than coal gas.

TABLE 1.—*Summary of Costs of Gas Production.*

Column No.	Type of Plant.	Final Calorific Value.	Conditions of Operation.	Net Cost per Therm.
		B.Th.U./Cu.Ft.		Pence.
1A ..	Intermittent Vertical Chambers.	500	Steamed to 500	1·086
1B ..		500	Steamed to 525 Strip 3 gallons benzole	0·818
1C ..		525	Steamed to 525	1·075
1D ..		525	Steamed to 553 Strip 3 gallons benzole	0·769
1E ..		550	Steamed to 550	0·947
2A ..	Continuous Vertical Retorts.	500	Steamed to 500	0·999
2B ..		500	Steamed to 520 Strip 2·25 gallons benzole	0·834
2C ..		520	Steamed to 520	1·036
4F ..	Coke Ovens.	605	Straight gas	1·091
4G ..		570	Straight gas Strip 3·5 gallons benzole	0·801

(*For Table 2 see p. 360*)

TABLE 3.—*Costs of Gas Production in Coke Ovens.*

Coals, such as Wear Specials, having a bulk density of not less than 1,458 lb. per cu.yd., a volatile matter content of not less than 33%, and moisture and ash contents not exceeding 2% and 6% respectively. All gas yields at 60° F. and 30 in. Hg. wet.

RESULTS—
24 ovens carbonizing 303 tons of coal per day.
12,230 cu.ft. of benzolized gas at 605 B.Th.U. per ton of coal.
Dry ash-free fuel = 10% (equivalent to approximately 11·75% dry coke).
Possible to extract 3·5 gallons of crude benzole.

ASSUMPTIONS—
17 men per day required on battery of 24 ovens.
Tar yield, 10 gallons per ton.
All breeze made used in producers (about 6% below ½ in.).
Same costs, values, &c., as for intermittent vertical chambers and continuous vertical retorts.

Column No.	4F.	4G.
No. of ovens	24	24
C.V. of gas made, B.Th.U./cu.ft.	605	605
Make per ton, cu.ft.	12,230	12,230
„ „ „ „ , therms	74·0	74·0
Crude benzole (65% at 120° C.) per ton, gallons	*Nil*	3·5
C.V. of final gas—not less than—B.Th.U./cu.ft.	605	570
Total coal used per day, tons	303	303
Make of final gas per ton, cu.ft.	12,230	12,090
„ „ „ „ , therms	74·0	68·9
„ „ „ day, cu.ft.	3,706,000	3,663,000
„ „ „ „ , therms	22,420	20,880
Fuel consumption, %	11·75	11·75
Surplus coke above ½ in. (5% H_2O), cwt./ton	12·25	12·25
Tar yield per ton, gallons	10	10
Labour on coke oven plant per day	17	17
Cost of coal per day Shillings	6,060	6,060
Cost of labour per day. „	170	170
Total cost. „	6,230	6,230
Value of coke per day. „	3,560	3,560
„ „ tar „ „ „	631	631
Profit on benzole per day. „	—	643·8
Total credit. „	4,191	4,834·8
Net cost per day. „	2,039	1,395·2
Net cost per therm. Pence	1·091	0·801

(Excluding capital charges, &c., power to work plant (this is quite small for the battery only), and cost of adding B.W.G. to above C.V.'s to reduce to 550, 525, or 500 B.Th.U. gas.)

Ground Space Available.

The ground space available at a particular works has been in many cases the determining point in the type of plant installed. The selection of a plant capable of giving a large gas output per sq.ft. of ground space has in certain cases obviated the need for building a new manufacturing station.

This subject of comparative output per unit of ground space was dealt with by T. Hardie in 1927 and subsequently by E. G. Stewart in 1930. It was also dealt with by F. B. Richards in 1938, from whose Paper "Carbonization from a Plant Designer's Viewpoint" the following table is quoted.

This table compares the output of therms per sq.ft. of ground space in installations of different types and also in installations of one type but of different sizes. In each of the new instances given the ground space occupied is that required to house the carbonizing plant and to give necessary access all round it. Thus provision is made for retort or chamber bench, producers, waste heat boilers, quenching towers, and that portion of the coal and coke handling plant within the confines of the retort house. In the case of the coke oven plant the ground space indicated is that required for the operation of the battery (providing necessary pusher ram clearance, &c.), together with the space required for a mechanical producer plant to heat the ovens.

From the table it can be seen that continuous vertical retorts offer the greatest output per unit of ground space, followed by intermittent vertical chambers, horizontal retorts, coke ovens, and inclined retorts in descending order. It is of interest to note that examples D and J represent similar outputs of gas per day and therefore are a close measure of the relative output of continuous vertical retorts and intermittent vertical chambers per unit of ground space. It will be seen that for a plant making 45,000 therms intermittent vertical chambers occupy 47% more ground space.

Taking the three similar sized installations for continuous vertical retorts, intermittent vertical chambers, and horizontal retorts, examples F, K, and B, and assuming that the ground space occupied by the continuous vertical retort plant is expressed as 100, then the comparative figures for intermittent vertical chambers and horizontal retorts are 115 and 183 respectively.

Even for very large plants the output of coke ovens per

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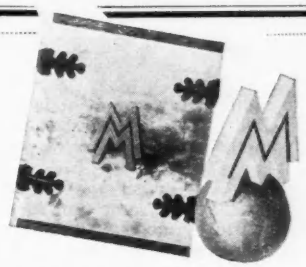

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TABLE 2.

DURHAM UNSCREENED COALS: Such as Wear Specials having a bulk density of not less than 1,458 lb. per cu.yd., a V.M. content of not less than 33%, and moisture and ash contents not exceeding 2% and 6% respectively.
Air admitted for purification not to exceed 3% by vol. All gas yields at 60° F. and 30 in. Hg. wet.

	42 × "3¾ ton" Nominal Size Intermittent Vertical Chambers: Non-Recuperative and Breeze Burning.					30 × 103 in. Continuous Vertical Retorts: Non-Recuperative and Breeze Burning.		
Column No.	1A.	1B.	1C.	1D.	1E.	2A.	2B.	2C.
Calorific value of gas made, B.Th.U./cu.ft.	500	525	525	553	550	500	520	520
Make per ton of coal, cu.ft.	16,780	15,140	15,140	13,620	13,800	15,900	14,400	14,400
" " " " " therms	83·9	79·5	79·5	75·3	75·9	79·5	74·9	74·9
Crude benzole (65% at 120° C.) per ton. Gallons	*Nil*	3·0	*Nil*	3·0	*Nil*	*Nil*	2·25	*Nil*
C.V. of final gas—not less than—B.Th.U./cu.ft.	500	500	525	525	550	500	500	520
Total coal carbonized per day, tons	280	302·4	302·4	343·6	343·6	276·0	276·0	276·0
Make of final gas per ton, cu.ft.	16,780	15,020	15,140	13,500	13,800	15,900	14,300	14,400
" " " " " " therms	83·9	75·1	79·5	70·9	75·9	79·5	71·5	74·9
" " " " day, cu.ft.	4,698,000	4,542,000	4,579,000	4,641,000	4,744,000	4,388,000	3,946,000	3,974,000
" " " " " " therms	23,490	22,710	24,040	24,370	26,090	21,940	19,730	20,660
Dry fuel consumption, %	18·0	16·7	16·7	14·7	14·7	15·1	15·1	15·1
Surplus coke above ¾ in. (5% H_2O), cwt./ton	9·97	10·3	10·3	10·68	10·65	10·22	10·41	10·41
Surplus breeze below ¾ in. (5% H_2O), cwt./ton	0·20	0·37	0·37	0·62	0·62	0·50	0·50	0·50
Tar yield per ton, gallons	11	11	11	11	11	13	12	12
Surplus steam ex W.H.B. per hour, lb.	6,340	7,180	7,180	8,700	8,700	6,700	8,000	8,000
Labour on carbonizing plant per day	20	20	20	20	20	15	15	15
Cost of coal = 20s. per ton							Only 2·25 gallons taken out as final C.V. not to be less than 500 B.Th.U.	
Cost of labour = 10s. per shift per man (assumed)								
Value of coke = 20s. per ton								
Value of breeze = 5s. per ton (assumed)								
Value of tar = 2¼d. per gallon (assumed)								
Value of surplus steam = 1/6d. per 1,000 lb. (assumed)								
Profit on benzole = 8d. per gallon (assumed)								
Cost of coal per day, Shillings	5,600	6,048	6,048	6,872	6,872	5,520	5,520	5,520
Cost of labour per day, "	200	200	200	200	200	150	150	150
Total cost	5,800	6,248	6,248	7,072	7,072	5,670	5,670	5,670
Value of coke per day, "	2,791	3,115	3,115	3,670	3,659	2,821	2,873	2,873
Value of breeze per day, "	14	28	28	53·3	53·3	34·5	34·5	34·5
Value of tar per day, "	641·9	693	693	787·4	787·4	747·5	690·0	690·0
Value of surplus steam per day, "	228·2	258·5	258·5	313·2	313·2	241·2	288·0	288·0
Profit on benzole per day, "	—	604·8	—	687·2	—	—	414·0	—
Total credit	3,675·1	4,699·3	4,094·5	5,511·1	4,812·9	3,844·2	4,299·5	3,885·5
Net cost per day, "	2,124·9	1,548·7	2,153·5	1,560·9	2,059·1	1,825·8	1,370·5	1,784·5
Net cost per therm (excluding capital charges, &c.), Pence	1·086	0·818	1·075	0·769	0·947	0·999	0·834	1·036

sq.ft. of ground space is low in comparison with other types of carbonizing plant.

TABLE 4.—*Ground Space Occupied by Gas-Making Plants.*

Type of Installation.	Code Letter.	Total Output, Therms per Day.	Total Sq.Ft., Ground Space Occupied.	Therms per Day per Sq.Ft. Ground Space.
1	2	3	4	5
Inclined retorts	A Hardie	22,338	19,500	1·15
Horizontal retorts	B Hardie	34,560	23,400	1·48
Continuous vertical retorts	C Stewart	50,388	14,212	3·55
	D	46,670	13,300	3·50
	E Stewart	42,028	13,230	3·18
	F Hardie	31,200	11,520	2·71
	G	19,890	7,326	2·72
	H	5,724	2,580	2·22
	I	1,210	950	1·27
Intermittent vertical chambers	J (Recup.)	45,060	18,914	2·37
	K (")	34,040	14,432	2·36
	L (Non-rec.)	20,780	9,388	2·21
	M (" ")	1,920	1,830	1·05
Coke ovens	N (Stewart)	85,200	91,800	0·93
	O	84,500	62,200	1·35

Finally, I should like to indulge for a moment in a little fantasy as regards the flexibility of continuous and intermittent vertical systems from the point of view of gas and coke output.

One of the problems of the Gas Industry is to meet the varying demands of gas output. At the same time increased gas sales are usually accompanied by increased coke production. The sales of the latter are very competitive, and from time to time gas undertakings are embarrassed with fluctuations in coke demand or coke stocks. In the North it is usually the latter, but there are many undertakings, particularly in the South, where the demand for coke is often greater than corresponds to the amount of gas made, and there is a shortage of coke.

Let us consider for a moment what we have to play with.

Let us assume we have an installation of retorts capable of carbonizing 100 tons of coal a day. From this we shall get 80 therms of gas per ton, and, say, 13·5 cwt. of dry coke. We may get, if we want, 3 gallons of crude benzole. The amount of fuel used on the producers can be taken as 2·8 cwt. per ton. This will mean that we shall have 53·5 tons of coke for sale, for each 8,000 therms of gas sold.

But vertical retorts are now built which may be partially or wholly coal gas fired. If we were to heat the installation by 50% coal gas firing and 50% coke in producers, then, instead of having 80 therms of gas for sale, there would only be about 60 available, but the coke for sale would be increased from 53·5 tons to 60 tons—a decrease of 25% in gas output and an increase of nearly 11% on the coke for sale. Should we decide to go over to 100% coal gas firing, the gas output would be reduced by 50% and the coke for sale increased by over 20%. But the actual output of gas might have to be maintained. It would then be necessary to produce 16,000 therms per day, of which 8,000 would be sold (100% coal gas firing) and the coke available for sale would be increased from 53·5 tons a day to 135·0 tons. This would require double the capacity of carbonizing plant.

Looking at the problem the other way round, if it was customary to use gas partially or wholly for heating the retorts, the output of gas could be radically increased by taking gas off the settings and using producer gas (and coke) and selling the gas that was used for heating. There is no difficulty in modern settings in arranging facilities for this changeover, as conveniently as in changing over from blast furnace gas to coal gas on coke ovens—*i.e.*, as and when required, and even by automatic control. Where the net value of coke is about 25% greater than the cost of coal, it pays to use gas for retort heating rather than coke under many conditions of demand just described. This method could have the effect of reducing the usual holder capacity provided. The capital cost of holders is nearly as much as that of carbonizing plants.

Another flexible factor is benzole. Three gallons of benzole extracted, with a constant gas output, would entail an increase in coal carbonized and coke for sale. Benzole extraction may be looked on as a profitable large consumer of therms whose supply can be cut off to satisfy the rest. If benzole extraction were stopped, the calorific value would be increased, but more steam would be used for the reduction of calorific value to a standard and the output still further increased.

I think I have said enough to stimulate your interest in a sister industry having different problems to solve, but much of whose experience may with profit be studied.

OBSERVATIONS ON THE

Impermeable Concrete "Gunite"

by

W. NICOL BAIRD,

B.Sc., M.Inst.F., A.M.I.Mech.E., Assoc.M.Inst.Gas E.,

Deputy Engineer and Manager, Dunfermline Corporation Gas Department.

The Eastern District of the Scottish Junior Gas Association held a "Short Paper" Meeting at Dunfermline on Jan. 7, when four contributions were presented. We dealt last week with three of these and give the fourth below.

Gunite is composed of Portland cement, sharp sand, and water—all under the usual specifications for good concrete. The cement and sand are first mixed together in a dry state, using the proper gauge boxes (assuming 1 cwt. of cement to be equivalent to 1¼ cu.ft.). In our case the mixture was three parts of sand to one of Portland cement, and this was mixed dry to a uniform degree of density with the aid of a transportable, petrol driven, non-continuous mixing machine.

The nature of our problems in Dunfermline was threefold. In our purifier house (built in 1915) the four cast-iron boxes are supported by a number of brick piers about 14 ft. high and with a cross-sectional area of 1 ft. 6 in. square. Most of these columns had been showing serious signs of deterioration and some had signs of giving way to shear.

Secondly, half way up these columns is an interlacing of rolled steel joists which tie the columns together and also form the main support of a concrete floor, the interspaces of which are strengthened by a series of Hy-Rib reinforcement arches. This floor carries the wet oxide ejected by bottom discharge doors in the purifier boxes. The wet oxide, left lying there, soon drained itself of any excess liquor, which found a number of ways through the concrete floor and eventually dripped on the ground floor level where further supplies of oxide were being retained or revivified. Partly due to the liquor percolating through the floor with its consequent effect on the reinforcement and, no doubt, partly due to weather conditions, the concrete covering the patent Hy-Rib reinforcement had steadily peeled off until the stage had been reached that there was very little covering left and besides weakening the floor the exposed reinforcement was very ugly indeed.

The third repair was at another source altogether—namely, at our old coke hopper, which was built in 1909. In this case abrasion as well as weather and possibly bad workmanship in the first instance had contributed to reduce several of the reinforced members into a state of partial wreckage besides weakening the structure to an unknown degree.

In all three cases, Gunite itself would have been of no use without reinforcing material to build up the strength to as much or to an even greater amount than in its original state.

The work of carrying out these repairs was entrusted to the Concrete Proofing Company, of London and Glasgow, who are specialists in this particular type of work.

All three jobs were carried out at the same time, and this was an economy, as the operator, after applying a coat on one part, could leave that to dry while he was preparing some other surface.

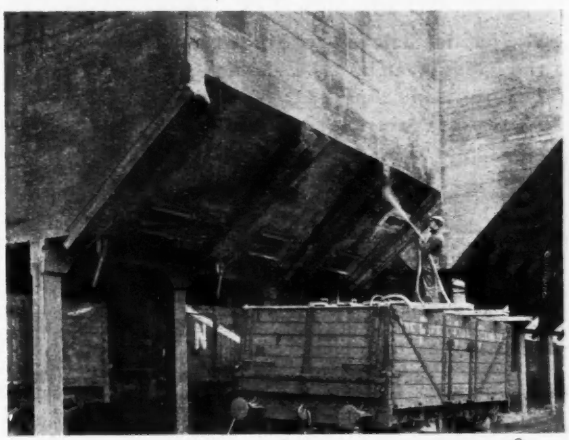
In the case of the brick columns, it was decided to encase these with a 2½ in. thick reinforced cover. The reinforcement consisted of a welded steel fabric made with $\frac{3}{16}$ in. diameter rods at 4 in. centres in both directions. This material was used on all three jobs, but the columns were further strengthened by additional $\frac{3}{8}$ in. round bars vertically.

The reinforcement fabric was supported in position by means of rawlplugs at about 3 ft. centres in both directions, and in cases of overlapping a minimum of 3 in. was allowed, and this was carefully secured by wire at intervals of 18 in.

Before fixing the fabric, the surface to be treated was thoroughly hacked with chipping hammers and then cleaned down with wire brushes so that all loose parts were removed and neither dirt nor scale was present to prevent an intimate bond between the brick and the cement. As a final security the air and water blast was always run over the surface immediately before using the gun. Whenever the application of any coat was interrupted, the Gunite was tapered off to a feathered edge in order to get a better bond on resumption.

A noteworthy feature of this method of applying cement to a structure is the great economy in the amount of shuttering required for a particular job. The reason for this is that only corner forming boards are required, and these can be moved as the work progresses. When the final layers have been "shot" a straight edge is drawn down the side shuttering boards to remove any high parts and generally level off the surface (*i.e.*, "screeding"). Otherwise each coat is left untouched or untrowelled in any way.

The speed of operation of the guniting itself can be imagined when it took four men steadily mixing and riddling to keep the gun charged during the period of application of a coat. The gun operator and the nozzle operator were, of course, fully occupied. The greatest amount of time was taken up by preparing the surface and in fixing the reinforcement. The illustration shows the work being carried out in patching the outside of the coke storage hopper.



In the three jobs some 37 tons of cement and 120 tons of sand were used to cover a total superficial area of about 840 square yards, consisting of respectively:

Coke hopper	50 sq. yd.
Underside of floor	390 "
Brick columns	400 "
	840 "

The average cost for the 2 in. thick reinforced Gunite rendering on the coke hopper worked out at 12s. per superficial yard, while the underside of the floor had a 1¼ in. thick covering costing 8s. per sq.yd. The brick columns, of which there are 36 in number, with, in addition, 16 side columns, each of which counted as being equivalent to half of the main columns in size, thus making a total of 44 columns, were encased 2½ in. thick and had a heavier reinforcement. The cost per column was £8 4s.

The cost must necessarily be relative to the thickness of the rendering, the weight of reinforced fabric, as well as the

character and contour of the work while the size of contract would also require some consideration.

For the duration of the work (six weeks) we supplied, in addition, four labourers to handle the materials, and on occasions we had a mechanic supervising the petrol-driven compressors and mixer. Taking the additional cost of the wages of these men *plus* a few minor extras, the whole of the work was carried out for a sum in the region of £800.

Within the Gunite, working stresses of 120 lb./sq.in. in tension and 1,500 lb./sq.in. in compression can be safely employed. Taking a comparable 3:1 concrete, this compares favourably with the usual working values allowed—namely, 100 lb./sq.in. in tension and 1,000 lb./sq.in. in compression.

The average weight of unreinforced Gunite is 142 lb. per cu.ft., which corresponds to a specific gravity of 2·27, and I append herewith, for the purposes of comparison, a few excerpts from a table of specific gravities and other properties of materials:

	Wt., Lb./Cu.Ft.	Sp.Gr.
Old mortar	90	1·44
Sand	95–118	1·52–1·89
Concrete	119–137	1· 9–2· 2
Cement	109	1·76
Sandstone	141	2·26
Granite	142	2·27
Gunite	142	2·27

From these characteristics it would appear that the Gunite approximates to sandstone and is identical to granite, while it is a definite improvement on the average concrete, with the attendant advantage of being less variable.

The resistance to crushing is compared in the following table, which again shows a close relationship with sandstone, but this time the superiority of granite makes itself manifest.

	Tons/Sq.In.
Cement	1½–2
Cement concrete	1
Portland stone	2
Brick (London	¾–1¼
Brick (Staffs.	2 –6
Brick (Fire	1
Granite	6 –10
Sandstone	2 –4
Gunite	2½–4½

It has not been possible within the scope of this short Paper to feature all the qualities of Gunite, and I have made no attempt to mention those which are in common with concrete, but I would like to draw your attention to the simplicity and speed with which the original materials can be delivered, by means of the flexible hose, from ground level to the point of execution of the work to be done, which may be the top of a chimney stack 250 ft. high or, in another case, some considerable distance underground, in a culvert.

DISTRICT CONDITIONS IN RELATION TO THE

Maintenance of Gas-Fired Hot Water Appliances

We publish below a report of the Discussion on the Paper given by Mr. Leopold Friedman (Chief Engineer and Assistant Managing Director of Ascot Gas Water Heaters, Ltd.), to the Western Junior Gas Association on Jan. 21, 1939.

The **President** (Mr. Alexander Tran, Reading) enquired whether the governors referred to in Australia were service or appliance governors. He thought water governors important and wondered if they could be used as a means of temperature control. He agreed with the Author that it was essential to have good fitting and thought the flue should receive special attention. He expressed the view that the maintenance figure of 2s. 4d. per heater was low. He favoured the inclusion of an all-in charge with the purchase to allow for maintenance.

Mr. Leopold Friedman, replying, said he was of opinion that the governors used in Australia were appliance governors, and said reference should be made to Mr. Masterman's Paper for confirmation. The water governor was effective in controlling water pressures above 15 lb. per sq.in. up to 200 lb. per sq.in.; a temperature regulator could be incorporated and there was an appliance on the market with this refinement. Regarding fitting, he was pleased to say that gasfitting was improving; and with regard to the flues he mentioned that birds' nests had caused trouble in numerous cases. While he agreed that the maintenance figures were low, they were nevertheless actual figures. His firm were always prepared to place their experience at the disposal of gas undertakings in assisting to reduce these costs.

Mr. A. G. Holtam (Cheltenham) said the figures given in the Paper for fitters' wages were very low. He could not get gas fitters at a weekly rate of £2 10s. Perhaps this would account for the low costs given for maintenance.

The **Author** said that, taking wages at £3 10s., the figure was 4s. 9d. instead of 4s. 3d.

Mr. A. B. Horsfield (Bristol) said that a lot of bad fitting work was due to private plumbers and gas fitters. When the original fitting was bad it was difficult to put it right after the house was completed.

Mr. H. L. G. Boot (Cheltenham), speaking of sulphur compounds, said he thought few works came near to Mr. Friedman's figure of 8 grains/100 cu.ft. He thought 15-30 more like the general figure.

Mr. K. L. Clark (Weston-super-Mare) reminded those present of a view previously expressed on maintenance, that while the Industry might pride itself on its maintenance service, the consumer would rather not be bothered by maintenance fitters, but preferred apparatus which required no regular visits. He noticed that credit was taken for by-pass consumption, but thought this gas would not be registered by any consumer's meter, and that it was in effect gas lost. On the matter of gum deposits he asked if the Author had found gum deposit in a plain orifice with no adjusting screw or spindle passing through the orifice.

Mr. Friedman said the manufacturers always aimed at producing apparatus which required as little attention as possible. The only reason for the small by-pass was that the Gas Industry had demanded that this gas should be cut down. He said that gum did not deposit in the Ascot pinhole burners, but he had no details of deposits in unobstructed orifices.

Mr. S. S. Lloyd (Weston-super-Mare) thought the manufacturers might improve the design to facilitate descaling. He thought it would be better if descaling could be done on the consumers' premises with greater ease.

The **Author** said that all these improvements could be incorporated, but they were always making to a price. Suggestions, however, were always welcome and he would keep them in mind when new designs were being considered.

Mr. R. C. Beake (Bath) spoke on the matter of standardization of calorific values and wondered whether there was an optimum C.V. for these heaters which gave a minimum volume of products for a specified heat content.

The **Author** agreed that this was a matter worthy of consideration.

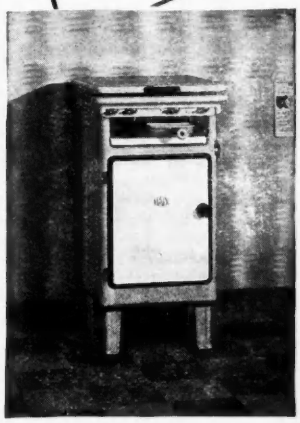
The **President** proposed the vote of thanks to Mr. Leopold Friedman for his Paper, to which the Author replied.

See the MAIN Stand, Ca 404-505, B.I.F., Birmingham

Here it is!

The MAIN 527 "STREAMLINED" GAS COOKER

Solidly built, principally of cast-iron to ensure stability and long life. . . . With rounded corners, smooth surfaces, and the minimum of projections. . . . Improved burners. . . . All connections concealed but accessible. . . . Stand provided with anti-rocking device. . . . Supplied with hinged cover, or, alternatively, a choice of standard plate racks, or the "PR. Hot Closet." . . . Dapple or Ivory and Black Enamel finishes are available.



Some of its Features:

HOTPLATE HOB—Cast in one piece, it may be lifted off for cleaning the burners.

GRILLER—A new rapid heating-up and grilling appliance. Ready for use in one minute, it will toast bread at the rate of one side every 45 seconds

CROWNPLATE—"Dished" to hold spilt liquids, it has no projecting trough.

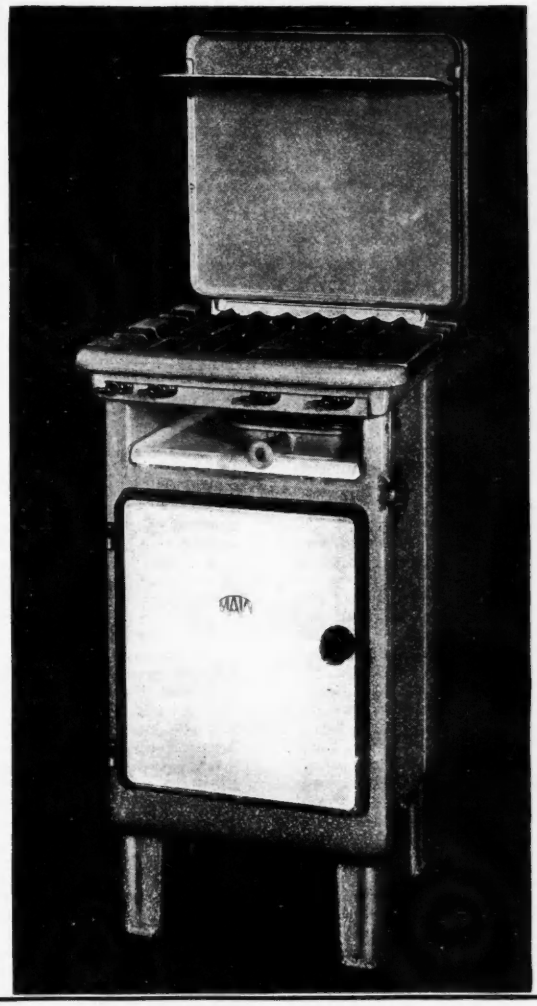
OVEN DOOR—Covers nearly the whole front, has small-size hinges, and embodies in one arrangement both a push-to latch and a positive tightening device.

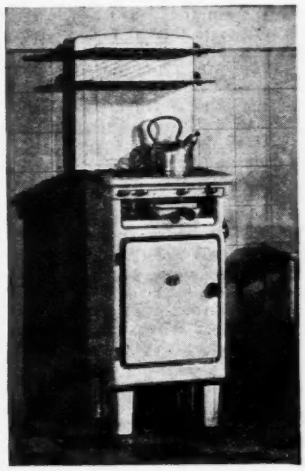
OVEN FURNITURE—Three grid shelves, offset and reversible to give alternative positions, are supported by runners stamped on the enamelled linings. The drip tin sits on a movable base-plate which can be lowered to provide a "cool zone."

BRASSWORK—All taps are of hot-stamped brass with spring loaded plugs. The taps do not project beyond the front cornice.

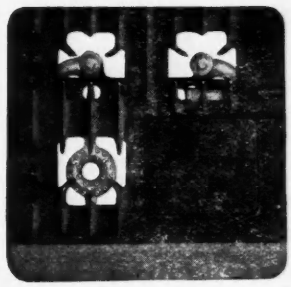
GAS CONNECTION—This is hidden by the hob. The oven supply-pipe is completely concealed.

Write for further details or, better still, order a sample Cooker for test.





One of the alternatives to the Hinged Cover: The Stamped Enamelled Double Plate Rack with Enamelled Back-plate.



The Hotplate, showing an arrangement of 2 "Ace" and 1 Ring type Boiling Burners, and the removable cover plate protecting the Griller. Ring type burners instead of "Ace" type can be supplied if preferred.

R. & A. MAIN LIMITED, LONDON AND FALKIRK

Coke Prices Enquiry

The Departmental Committee which is investigating the methods and costs of solid fuel distribution under the Chairmanship of Sir Walter Monckton, K.C., resumed its public Enquiry in the building of the Institution of Civil Engineers, Westminster, S.W. 1, on Tuesday, Jan. 31, when evidence was given mainly with regard to the distribution of coke.

Evidence was given first on Tuesday on behalf of the London and Counties Coke Association, which was represented by Mr. R. W. Foot (Chairman of the Association), Mr. W. L. Boon (the General Manager), and Mr. John Charrington, Jnr. (Chairman of the Coke Distributors' Branch of the Association).

A lengthy Memorandum was submitted on the work of the Coke Association in the distribution of coke in collaboration with the merchants, in an area embracing practically the whole of the South of England below a line from the Wash to the Bristol Channel. The Memorandum discussed the position of the consumer, of the gas companies as producers, and of the various distributors, and gave detailed costs of distribution.

Mr. *Foot*, replying to questions by the Chairman, who said that apparently the Association had managed to set up a monopoly in its area, emphasized that there was no monopoly, one reason being that coke competed with every other form of fuel—coal, gas, electricity, and oil. He agreed that 99% of the coke produced in the area was sold through the Association's scheme; the total annual sale of coke in the area approximated to 5 million tons, of which 3½ million tons was produced locally at gas-works; 1½ million tons of furnace coke was imported mostly from the colliery coke ovens in the Midlands. A large percentage of the coke from the Midlands was handled by the distributors who were taking part in the Association's scheme.

In reply to a question by Professor Clapham (a member of the Committee), Mr. Foot said that not all the gas companies in the area were members of the Association, but those outside represented a small percentage of the total coke produced. Thanks to the work of the Association, however, they found no difficulty at all in disposing of their coke; they were reaping the advantage of the Association's work, although they were not paying the levy of 2d. per ton on coke sold, which levy was paid by all gas company members to form the Association's income. The Association developed new markets and maintained those already established, promoted the design of improved and more effective appliances, and maintained a technical service which was available without charge to consumers, producers, and merchants. There were four grades of coke which met all the requirements of the users. When asked by the Chairman if it was necessary to resist demands for a good many more grades, he said that was not so; the consumers appreciated that the Association's technical staff were giving advice based on research and knowledge.

A Deliberate Policy.

The CHAIRMAN pointed out that according to the Association's Memorandum, whereas in 1930 the distribution of coke within the area was almost equally divided between direct deliveries by the Gas Industry to consumers and sales by merchants, to-day 66% of the total coke sold in the area was handled by the distributive trade. He asked whether that increase in the amount handled by the distributive trade was the result of deliberate policy.

Mr. *Foot* replied that it was quite deliberate. When the Association was formed, the producers had concluded without any doubt at all that it would be a mistake to keep the whole of the distribution in their own hands, and they had invited the merchants to co-operate. Otherwise, the gas companies would have had to establish depôts all over London and their expenses would have risen beyond all bounds—certainly beyond the amount paid to the merchants for distribution. The arrangements were working out as was intended. The total production of coke by the members of the Association had increased from 2¼ million tons in 1931 to 3,330,000 tons in 1937, a total increase of 830,000 tons. Of that increase the merchants were handling 753,000 tons, and the gas companies also were distributing more. It was certain that, if the gas companies had tried to do all the distribution, and sell at the same price as the merchants, their expenditure on organization would not have been economic.

Mr. *John Charrington*, Jnr., commented that the increase in coke sales was in his view very largely due to the helpful co-operation of the gas companies; it had resulted in the merchants taking more interest in selling coke, and as a result their sales had increased every year.

In reply to further questions, Mr. *Foot* said that if a producer or distributor broke the rules of the Association, the facts were considered by a Committee, and if necessary he was asked to resign. But that happened very seldom. If any member did something which was wrong, it was usually as the result of misunderstanding rather than intention. The scheme had worked extraordinarily well. Any bona fide dealer in coke could enter the scheme. There had been cases in which young men had saved a little money and set up their own businesses, but producers did not feel that they should interfere with that.

Mr. *Charrington* added that he supposed they would both be glad to see some limit to the number of traders; but so long as a man was selling coal, he should be given supplies of coke if he wanted them.

The CHAIRMAN, commenting upon the point made that price control assisted the maintenance of proper levels during depression, and prevented exploitation during booms, asked whether there had been any attempt to restrict supplies during depression.

Mr. *Foot* replied that, on the contrary, during the two bad periods of depression since the Association was formed, the production and sale of coke had increased, whereas perhaps other fuel businesses had not done so well. There had been a very bad position for coke in the South. Openings had been made for about 1½ million tons of Midland coke and suddenly supplies had practically dried up. Had the Association not existed, prices of coke would have gone sky high, and that would have been very bad for the coke business.

Strengthened by Distributors' Branch.

Mr. *Charrington*, replying to questions concerning the Distributors' Branch of the Association, which Branch was formed nearly three years ago and had immeasurably strengthened the position with regard to service and operation of coke marketing throughout the Association's area, said that the membership of the Branch was more than 4,000. In the country districts there were quite a number of small coal merchants who did not sell coke at all, but they were not excluded from membership.

The CHAIRMAN commented upon further statements in the Memorandum. It was stated there that every trader, except only the very small dealer, must become a member of the Association (for which he paid no fee or subscription) before he could obtain supplies of coke from any associated producer. The goodwill of the distributive trade had been strengthened by that closer alliance with the producers, the turnover of business through the distributors had considerably increased, and the merchants' margins had been generally improved. The Chairman asked whether the costs to the distributors would not be reduced by their increased turnover.

Mr. *Charrington* replied that a merchant's sales of coal were probably correspondingly down and there might be no great change in his total tonnage. At the beginning of the scheme the merchants' margins were very inadequate.

The CHAIRMAN raised the question of a small trader, such as a greengrocer, selling 7 lb. packages of coke at the wrong prices, and asked if that matter could be put right through the machinery of the Association.

Mr. *Foot* replied that the machinery of the Association did not go so far as to prevent that.

Questioned with regard to factors and wholesale merchants, he said that they were dealing with substantial quantities, which tended to increase naturally as the market expanded. The factor was a balancing influence with regard to distribution. If it could be arranged that wherever coke was wanted, the necessary quantity was produced, the factor would be out of business; but because that state of affairs did not obtain, the factor was performing an essential service. As to how far the factor was necessary, he pointed out that, in the first place, the 1½ million tons per annum obtained from the Midlands had to be brought to the South, and the gas companies could not handle that. Again, a gas company might produce most of its coke at a place where there was hardly any demand, and it was a very great help to have a factoring organization in touch with the small merchants, helping to distribute it. The producers did not wish the factoring business to extend beyond what it should be, and they watched the matter closely. There was a factor's roll, and anyone who wished to get on to that roll had to provide a very good reason for starting in the business. He believed the greater part of the factors' business was concerned with distribution in relatively small quantities to small merchants. There were country places where, if the factor did not know the business, it would not be done.

Mr. *Charrington* expressed the view that the costs of factoring coke were as much as those of factoring coal. The factor had to obtain supplies of coke from a large number of places throughout the country.

The CHAIRMAN, discussing the Association's price schedule for the London group, said it appeared that a contractor could buy 5,000 tons or more at 29s. per ton *ex* gas-works. If he delivered at consumers' premises in quantities of 1,500 tons or more, he could sell at 37s. 2d. He could sell in 10-ton lots at 41s. 8d., or could sell one ton at 43s. 4d. So that the margin between 29s. and the selling price varied from 8s. 2d. to 14s. 4d., according to the quantities he sold. The Chairman asked whether a contractor would ever be in a position to take the factorage as well.

Mr. *Foot* replied that he would not. That matter had been very closely watched, and each individual transaction by a factor had to be declared in detail to the producer, in order to safeguard the factorage.

Mr. *Charrington* said that the factor did not sell a large tonnage of coke in the small quantities which provided the larger margins; almost all his coke was sold to biggish consumers. He was told that the average contractor's margin was about 8s. 6d. Broadly speaking, he could see no reason why there should be any difference between margins for coke and coal. Coke was more bulky than coal and it cost more to load.

Mr. *Foot*, replying to a question concerning the point that the margins of merchants had increased by 22% since the Association was formed (the formation of the Distributors' Branch of the Association had not made any difference in that respect), said that the Association had from the very beginning approached the problem from the point of view that margins should be fair and reasonable; the matter was approached from the point of view of the cost and value of the service the merchants performed.

Replying to a question as to whether the Co-operative Societies came into the scheme, Mr. Foot stated that they did, and that they sold at the scheduled prices. The only unavoidable factor of difference was the Co-operative dividend.

Questions were raised with regard to the fact that the selling price to the consumer was fixed first, and the producers' price was fixed afterwards; the point was whether, although coke might be produced more cheaply, with a reasonable reward to producers and contractors, the consumer would still pay the retail price fixed for competitive reasons.

Mr. *Foot* replied that the consumer of solid fuel was probably better protected than the consumers of many other products.

Evidence from Birmingham.

Evidence was given on behalf of the Birmingham Corporation Gas Department by Mr. A. W. Smith (General Manager and Secretary) and Mr. R. A. Dry (Chief Coke Salesman). A memorandum stated that as long ago as 1902 the Birmingham Gas Department had recognized the desirability of marketing coke in an orderly manner. A minimum retail selling price was then fixed, to show a reasonable margin of profit to the merchants, and the method had proved so successful that it had been retained, and adopted by other gas undertakings. It maintained proper price levels, and prevented profiteering during boom periods or excessively cold weather.

Replying to the Chairman, Mr. *Smith* said the scheme had not resulted in a reduction of the number of merchants in the area. He imagined the number had increased considerably, although, having regard to the expansion of Birmingham, he thought there were no more distributors than were necessary for the service of the community.

Professor CLAPHAM suggested that the price fixed might well have been referred as a "price" rather than a "minimum" price.

The CHAIRMAN added that the omission of the word "minimum" might be more reassuring to the consumers.

Mr. *Smith*, after referring to the free technical service and advice given to consumers and merchants, gave a table showing the margins allowed to merchants over a number of years (1918-1922) between the net buying price and the selling price. From October, 1922, until to-day the margin on loose coke was 7s. 3d., and on bagged coke 9s. 3d. Merchants who paid their accounts on the 15th of the month following supply were allowed a discount of 2½% off the works price. The difference between the 7s. 3d. and 9s. 3d. was the actual difference in cost as between delivering loose and in bags. The merchants were claiming, perhaps with some justice, that at the moment the margin was very poor, but so far the minimum prices had been maintained. To save the expense of stacking at the works, the screened and sized fuel was loaded during the night into railway wagons and despatched to the various wharves around the city, numbering over fifty, whence the merchants loaded it as required and delivered straight to their customers. The same price was charged for the coke purchased at the depôts as at the gas-works, the gas undertaking bearing the cost of railway rate and wagon hire.

An Association having similar objects to the London Counties Coke Association had recently been formed to cover the Midland Counties, and would shortly introduce price regulation in the same way and in conjunction with the distributive trade. He did not anticipate that that would result in a difference in prices; they would be fixed to a large extent according to locality.

In reply to further questions, he said that by organizing production and sales, the Gas Department was selling 80% of its production in its own area, whereas formerly much of it was dumped in London. It had spent thousands of pounds on improving the quality of the product; and to deal with distribution it had had to control prices. The merchants had been very loyal, and he did not think there was a single merchant in the area who was outside the "gentlemen's agreement" to honour the prices fixed and not to under-cut each other. It was not a written agreement. The Department had not considered it necessary to regulate the number of merchants with whom it dealt. It found out the destination of the coke, and if one merchant was already supplying coke to that destination it had protected his business. Consumers were protected by the knowledge that at any time they could obtain coke from the gas-works at the same price as from the merchants. Coke prices were fixed according to the prices of competitive fuels.

The Position in Edinburgh.

Mr. *A. F. Pollock* (Commercial Assistant to the Engineer and Manager, Edinburgh Gas Department) next gave evidence in support of a memorandum submitted by his Department. It showed that during the last completed financial year, to May 28, 1938, the Department had sold 48,000 tons of coke in the home market, of which 33,000 tons was sold to distributors, and 15,000 tons direct to consumers. The figures were very similar to those for the previous year, but sales showed a rising tendency. There seemed no special reason why some consumers preferred to buy direct. Practically the whole of the coke sold to distributors was delivered to them in railway wagons and charged at 30s. per ton free on rail at their own depôts. There was another grade, selling at 6d. more per ton. The cokes were screened by the Department.

The selling price of coke delivered in bags was originally fixed by arrangement with the Coal Merchants' Association, whose members marketed most of the coke at 8s. 6d. per ton over the delivered price in wagons at Edinburgh stations, subject to slight additions for coke delivered in small lots of 1 or 2 cwt. A merchant who adhered to the arranged prices received 40s. per ton for deliveries in 1 and 2 cwt. lots, and 38s. 6d. for deliveries in larger quantities. Thus, the distribution charges to the consumers by the merchant were 10s. and 8s. 6d. per ton respectively. There was a certain amount of price-cutting among the merchants themselves.

There was no obligation upon the merchant to sell at the arranged prices, and it was known that for household deliveries higher prices were charged, while for large contracts lower prices were charged.

Conditions at Cardiff.

Mr. *H. D. Madden* (Chief Engineer and Manager of the Cardiff Gas Light and Coke Company) gave evidence in regard to conditions at Cardiff, where the Company dealt direct with consumers as far as possible; probably 90% of the coke business was done in that way. The Company marketed four grades of coke, and sales were divided between domestic and commercial users, industrial users, and shipment business. The total annual sales since 1934 amounted to about 35,000 tons; in addition to the quantities sold, large quantities were also used for the Company's own purposes. A proportion of the coke used for domestic purposes was collected from the works by consumers, the remainder being delivered by the Company. During 1937 there were no less than 36,750 individual sales of ½ cwt. or 1 cwt. collected by the consumers from the works. A printed price schedule providing for all types of requirement, either for collection at the Company's works or for delivery to consumers' cellars or stores, was arranged. The figures showed that there was a difference of 3s. 6d. per ton between the prices at works and the prices when delivered in the City; and another 1s. was added to the price for deliveries in outside districts. It was not claimed that the differences between the delivered prices and the works prices represented an economic return on the work entailed in distribution; they did not include any overheads, or bagging charges.

The Company's prices were governed by the competition of furnace coke, of which very large quantities were manufactured at coke ovens within easy reach of the City. The price of coke at works had been fixed for the last twelve months at 28s. 6d. per ton. The extra 3s. 6d. per ton charged for delivery represented the bare charge for haulage.

Asked whether any attempt had been made to arrange prices with the furnace coke producers, he said they had approached the Company, but no agreement was made. The matter was in the air at the moment. He agreed that the Company had not avoided under-cutting by furnace coke as the result of selling direct to the consumers. If the risk of fluctuation could be avoided he would still deal direct. He preferred that, and did not find it incompatible or uneconomic to do the distribution work.

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Braddock's Patent Retort House Governors are unsurpassed for general excellence.

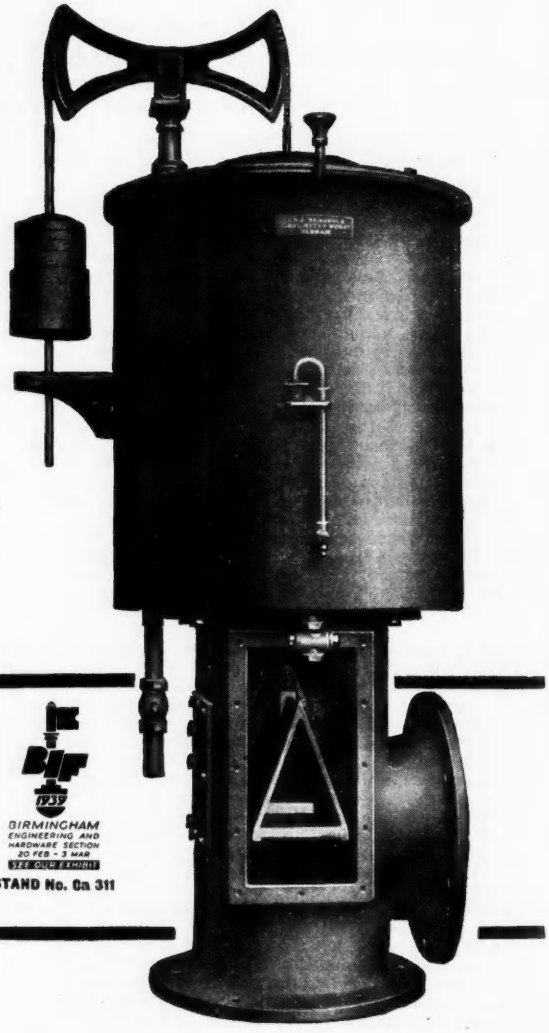
Especially desirable for use with vertical retorts.

Extremely Sensitive.

Detachable side plate enables valve to be easily removed and cleaned without disturbing any other parts.

Hydraulic Distance Control can be fitted if desired.

Particulars and prices upon application.



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STAND No. Ca 311

Markets and Manufactures

Current Sales of Gas Products

The London Market

Feb. 6.

There is little change to report in the values of Tar Products in the London market, which are as follows:

Pitch, nominal, at about 30s. per ton, f.o.b.
Creosote, about 3½d.
Refined tar, 3¾d.
Pure toluole, about 2s. 3d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, 10s.
All per gallon naked at makers' works.

The Provinces

Feb. 6.

Crude Gas-Works Tar, 12s. 9d. to 17s. 9d.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 29s. to 30s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 29s. to 30s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7½d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¼d. to 4⅜d.; low gravity, 4¼d. to 4¾d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil; Unfiltered anthracene oil, min. gr. 1.080, 4¾d. to 4¾d; filtered anthracene oil, min. gr. 1.080, 5¼d. to 5¾d.; heavy tar oil, gr. less than 1.080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Feb.* 4.

While there is a slightly more hopeful feeling in the market generally, the actual position remains unchanged on the week's trading.

Crude gas-works tar.—Actual value is about 34s. to 35s. per ton *ex* works in bulk.

Pitch of vertical quality is easy at 21s. to 22s. per ton f.o.b. for export and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—Home prices are fixed at 3¼d. to 4d. per gallon, and, for export, quotations are at round 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil.—Makers are maintaining prices as under: Specification oil, 3¼d. to 4d. per gallon; low-gravity, 4¼d. to 4¾d. per gallon; neutral oil, 3¾d. to 4¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—Very little interest is being taken in this product with values approximately as follows: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is unchanged at 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon, and 90/190 heavy naphtha is round 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. 6d. to 9s. 6d. per gallon and 90/140 grade is 9s. 6d. to 10s. 6d. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9½	to	0	10	per gall. at works
Motor „ ..	1	3	„	1	3½	„ „ „
90% „ ..	1	4	„	1	4½	„ „ „
Pure „ ..	1	8	„	1	8½	„ „ „

Contracts Advertised To-Day

Condensers.
Bury Gas Department. [p. 374.]

Electrical Brakes for Hoist.
Burnley Gas Department. [p. 373.]

Gasholder Inspection.
Bingley Gas Department. [p. 374.]

Gasholder Repairs.
Bala Gas Department. [p. 374.]

Meters.
Stockton-on-Tees Gas Department. [p. 374.]

Meters and Repairs.
Manchester Gas Department. [p. 373.]

Oxide of Iron (New and Spent).
Manchester Gas Department. [p. 373.]

Stores.
Stockton-on-Tees Gas Department. [p. 374.]
Stoke-on-Trent Gas Department. [p. 374.]

Tar Tank.
Bala Gas Department. [p. 374.]

Weighing Machine Maintenance.
Manchester Gas Department. [p. 373.]

Dividend Announcements

East Surrey.—At a meeting of the Board of the East Surrey Gas Company held on Jan. 31 it was decided to recommend the under-mentioned final dividends (all less income-tax at 5s. 6d. in the £) for the year ended Dec. 31, 1938: On Ordinary "B" Stock 3% actual, making 6% for the year; on Cumulative Preference Stock 3% actual, making 6% for the year; on redeemable Preference Stock, 2¼% actual, making 4½% for the year; and on Preference "A" Stock, 2½% actual, making 5½% for the year.

Yorktown (Camberley).—At a meeting of the Board of the Yorktown (Camberley) and District Gas and Electricity Company held on Jan. 31 it was decided to recommend the undermentioned dividends: 5% Consolidated Preference Stock at the rate of 5% per annum (less tax at 5s. 6d. in the £) in respect of the half-year ended Dec. 31, 1938, making 5% for the year; 5% Standard Consolidated Ordinary Stock at the rate of 6½% per annum (less tax at 5s. 6d. in the £) in respect of the half-year ended Dec. 31, 1938, making 6½% for the year. Combined profit, revenue accounts, for gas and electricity undertakings for the year was £28,486, compared with £24,584 last year.

The General Meeting will be held on Feb. 27.

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METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

. . . for flexibility

Plants recently started up have shown again the great flexibility of Glover-West verticals.

A sudden rise or fall in the load creates no difficulties in the retort house. The rate of production can be changed readily over a wide range.

THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

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WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: Albion Ironworks, Miles Platting — 'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: Columbia House, Aldwych, W.C.2 — 'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

GAS STOCKS AND SHARES

As an outcome of the speeches by Mr. Chamberlain and Herr Hitler more confidence was in evidence on the Stock Exchange last week and the recovery in prices was widespread. A fillip to the upward movement was also given by the decision to re-value the Bank of England's gold stocks. Some end-Account profit taking took place, but this had little effect on quotations, the majority of which closed considerably higher than a week ago. British Funds gained ground, and despite further reductions in traffic receipts the values of home rail stocks made considerable improvement—Southern preferred rising from 49 to 56. Foreign bonds were also a strong feature. Many industrials more than recovered their previous losses, though activity in this section eased up towards the close.

Business in the Gas market was somewhat restricted last week, but this is not unusual when activity suddenly breaks out in the more speculative sections. Price changes, though few, were nearly all upwards, and it is satisfactory to note that Gas Light units, which had been steadily weakening during the last few weeks, made a good recovery with a gain of 1s. 6d. to 22s. 3d. Imperial Continental also benefited and rose 7 points to 119½, while Watford and St. Albans closed 2 points higher at 132½. The only change of note on the Provincial Exchanges was a drop of 5½ in Hartlepool consolidated to 82½, and apart from a drop of 3 in Croydon 4% preference nominal quotations in the Supplementary List remained unchanged.

The accounts of the three Metropolitan Companies have now been published. Having regard to all the adverse circumstances, the South Metropolitan have come through remarkably well, but in the case of the Gas Light, although the gross profit is slightly higher, the carry-forward is reduced from £102,376 to £53,598, while the Commercial has found it necessary to transfer £4,669 from the Reserve Fund to pay the reduced dividend of 4½%. The significant fact which emerges in perusing these accounts is the extent to which companies are now dependent on the maintenance of residual prices. Moreover, it was possible in the past to estimate fairly accurately the revenue to be derived from the sales of gas for a given period and amend the price accordingly, but with various tariffs in operation this will not be so easy, and the additional time lag which may arise under these circumstances before extra gas revenue can be obtained to meet rising costs would have a serious effect on the balance of profit.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 3.	Rise or Fall on Week.
1,767,439	Sept. 5	8	8	Alliance & Dublin Ord. ...	130—140	...
374,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	93—98	...
734,733	Nov. 7	5	5	Asscd. Gas & Water U'd'ts Ord.	17/—19/–	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
444,389	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	19/—21/–	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/–	...
500,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
560,070	Aug. 22	7	7	Barnet Ord. 7 p.c.	158—162	...
300,000	Oct. 10	1/9.2	1/4.1	Bombay, Ltd.	22/6—24/6	—/6
180,435	Aug. 22	9½	9½	Bournemouth sliding scale ...	195—205	...
640,407	,,	7	7	Do. 7 p.c. max. ...	157—162	...
495,960	,,	6	6	Do. 6 p.c. Pref. ...	130—135	...
50,000	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75—80	...
312,025	,,	4	4	Do. 4 p.c. Deb. ...	96—101	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	143—148	+1
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	126—131	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	127—132	...
855,000	Sept. 19	8	7	British Ord.	132—137	...
100,000	Dec. 19	7	7	Do. 7 p.c. Pref.	138—143	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	112—117	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,000	22May'33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—2	...
150,000	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	Dec. 19	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...
98,936	Sept. 19	2/–	2/–	Colombo Ord.	1½—1¾	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	22/6—24/6	...
739,453	Oct. 10	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/6—25/6	...
1,775,005	Jan. 23	5	4	Commercial Ord.	73—78*	...
140,000	,,	—	§13/4	Do. 4 p.c. Red. Pref. ...	95—100	...
620,000	Dec. 5	3	3	Do. 3 p.c. Deb. ...	70—75	...
286,344	Aug. 22	5	5	Do. 5 p.c. Deb. ...	113—118	...
200,000	,,	—	§30/2	Do. 3½ p.c. Red. Deb. ...	97—102	...
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140	...
644,590	,,	5	5	Do. max. div. ...	100—105	...
620,385	Dec. 19	5	5	Do. 5 p.c. Deb. ...	112—117	...
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c.	95—100	...
186,155	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121	...
176,211	Dec. 5	5	5	Do. 5 p.c. Deb ...	112—117	...
250,000	Nov. 7	8	4	Gas Consolidation Ord. 'B' ...	19/—21/–	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
9,223,324	Aug. 8	5⅞	5⅞	Gas Light & Coke Ord. ...	21/9—22/9a	+1/6
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	73—78	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	94—99	–1
2,993,000	Jan. 9	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	93—98	–1½
8,602,497	Nov. 21	3	3	Do. 3 p.c. Con. Deb. ...	72—77	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	109—113	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	107—111	...
700,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
270,466	Aug. 22	6	6	Harrogate New Cons. ...	117—122	...
157,500	Mar. 21	1/2⅜	‡1/–	Hong Kong and China Ord. ...	⅜—⅝	...
213,200	Aug. 8	6	5⅜	Hornsey Con. 3½ p.c. ...	97—102	...
5,600,000	Oct. 24	12	8	Imperial Continental Cap. ...	117—122	+7
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—101*	...
235,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	160—165	...
63,480	Dec. 19	3	3	Maidstone 3 p.c. Deb. ...	69—74	...
45,000	Nov. 21	†10	†10	Malta & Mediterranean ...	130—135	...
				Metropolitan (of Melbourne)		
392,000	Oct. 3	5½	5½	5½ p.c. Red. Deb.	100—105	...
231,977	Aug. 22	5	5	M.S. Utility 'C' Cons. ...	99—104	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	93—98	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 3.	Rise or Fall on Week.
390,076	Dec. 19	4	4	M.S. Utility 4 p.c. Deb. ...	95—100	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	112—117	...
125,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Bds.	94—97	...
675,000	Nov. 21	†6	†6	Montevideo, Ltd.	70—75	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Oct. 24	†7	†9	Oriental, Ltd.	145—150	...
468,537	Dec. 5	8	7½	Plymouth & Stonehouse 5 p.c.	130—140	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162	...
241,446	,,	5	5	Do. 5 p.c. max. ...	100—105	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	90—95	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	105—110	...
247,966	Dec. 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	96—101	...
625,959	Jan. 9	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Sept. 5	6	6	San Paulo 6 p.c. Cum. Pref. ...	8½—9	...
441,275	Sept. 19	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	20/6—22/6	...
460,810	Sept. 19	–/10½	–/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 22	5	8½	Shrewsbury 5 p.c. Ord. ...	143—148	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Aug. 22	1/2⅝	1/2⅝	South East'n Gas Cn. Ld. Ord.	21/—23/–	...
871,636	,,	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/—19/–	...
450,000	Aug. 8	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97	...
6,709,895	Aug. 8	6	5	South Met. Ord.	102½—105½	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	128—133	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	93—98	...
1,895,445	Dec. 19	3	3	Do. 3 p.c. Deb.	73—78	–1
1,000,000	Jan. 9	5	5	Do. 5 p.c. Red. Deb. ...	108—111	...
600,000	,,	§31/–	3⅜	Do. 3⅜ p.c. Red. Deb. ...	98—101	...
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	111—116*	...
512,825	,,	5	5	Do. 5 p.c. Pref.	108—111*	...
500,000	,,	4	4	Do. 4 p.c. Pref.	93—98*	...
250,000	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	91—96*	...
888,587	Dec. 5	5	5	Do. 5 p.c. Deb.	113—118	...
250,000	,,	4	4	Do. 4 p.c. Deb.	95—100	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Sept. 19	8	9⅜	S. Western Gas & Water Ord.	16/—18/–	...
160,523	Oct. 10	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pf.	19/—21/–	...
110,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c. ...	105—110	...
148,836	Dec. 19	4	4	Do. 4 p.c. Deb. ...	93—98	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	105—110	...
200,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...
1,076,490	Aug. 8	6⅝	6⅝	Tottenham and District Ord.	127—132	...
409,835	,,	5⅛	5⅛	Do. 5½ p.c. Pref.	116—121	...
62,235	,,	5	5	Do. 5 p.c. Pref.	108—113	...
334,615	Dec. 5	4	4	Do. 4 p.c. Deb.	95—100	...
85,701	Jan. 9	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	18/—19/–	...
1,051,280	Nov. 7	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/—21/–	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/–	...
745,263	Dec. 19	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	15/6—17/6	...
1,066,186	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
375,689	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	125—130	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	132—137*	...
2,525,768	,,	4	4	Do. 4 p.c. Pref.	93—98*	...
1,343,964	Dec. 19	5	5	Do. 5 p.c. Deb.	113—118	...
383,745	,,	4	4	Do. 4 p.c. Deb.	95—100	...
400,000	,,	§25/–	3⅜	Do. 3⅜ p.c. Red. Deb. ...	96—101	...
558,342	Aug. 8	7	6⅞	Watford and St. Albans Ord.	130—135	+2
200,000	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	113—118	...
200,000	,,	—	16/8§	Do. 4 p.c. Red. Pref. ...	95—100	...
200,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Feb. 3.	Rise or Fall on Week.
£202,152	Sept. 5	5	5	Ascot Ord.	101—106	...
128,182	Dec. 19	5	5	Do. 5 p.c. Pref.	107—112	...
31,035	Aug. 22	—/4[1]	—/4[1]	Associated Utilities 4 p.c. Pref.	16/—18/—	...
100,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Aug. 22	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	145—155	...
37,440	Aug. 8	10	10	Cam. Univ. & Town 10 p.c. max.	188—198	...
125,970	,,	7	7	Do. 7 p.c. max.	133—138	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	93—98	—3
130 000	Dec. 19	4	4	Do. 4 p.c. Deb.	95—100	...
65,000	Aug. 8	8¼	7¼	Eastbourne 'A' 5 p.c. ...	140—145	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	114—119	...
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	Dec. 19	5	5	Do. 5 p.c. Deb.	110—115	...
24,000	Aug. 8	8¼	8¼	Great Yarmouth 8¼ p.c. max.	43—48	...
59,400	,,	7⅞	7⅞	Do. 7⅞ p.c. max.	33—38	...
51,160	Dec. 5	5⅛	5⅛	Do. 5⅛ p.c. Deb.	120—125	...
152,600	Sept. 5	9	8	Guildford Cons.	163—168	...
54,055	,,	5	5	Do. 5 p.c. Pref.	107—112	...
68,250	Dec. 19	5	5	Do. 5 p.c. Deb.	110—115	...
156,600	Aug. 22	7¼	7¼	Hampton Court Cons. ...	126—131	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	90—95	...
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126	...
94,876	Dec. 5	4	4	Do. 4 p.c. Deb.	94—99	...
73,620	Sept. 5	8¾	8¾	Luton Cons. 'A'	153—163	...
107,960	Sept. 19	5⅛	4	Mid Kent Ord.	8½—9⅛	...
230,940	Aug. 8	10	10	Oxford & District Ord. ...	195—200	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112	...
126,193	Nov. 7	7⅛	7⅛	Peterborough Ord.	137—142	...
64,990	Sept. 5	6⅞	7⅛	Redditch Ord....	118—128	...
166,850	Aug. 8	8	8	Romford Ord....	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	99—103	...
44,000	Sept. 19	5	5	Do. 5 p.c. Deb.	112—117	...
25,570	Aug. 8	5⅛	5⅛	Rugby 5⅛ p.c. Pref.	120—125	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109	...
42,750	Dec. 5	5⅛	5⅛	Do. 5⅛ p.c. Deb.	117—122	...
110,950	Aug. 22	8	8	Ryde Ord.	140—150	...
270,086	Sept. 5	7	7	Slough Ord.	128—133	...
21,000	Dec. 19	5	5	Do. 5 p.c. Deb.	108—113	...
28,872	Nov. 7	5⅛	5⅛	S. Midland Gas Cpn. Ltd. Ord.	17/—19/—	...
28,866	Sept. 5	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/—	...
117,228	Aug. 8	7	5	Swindon Cons.	102—107	...
60,425	Dec. 5	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	Dec. 19	5	5	Torquay & Paignton 5 p.c. Pref.	105—110	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106*	...
98,384	Aug. 22	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	Dec. 19	5⅛	5⅛	Do. 5⅛ p.c. Rd. Db.	103—108	...
90,000	Dec. 19	5	5	York 5 p.c. Red. Deb. ...	103—108	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	Dec. 5	5⅛	5⅛	Do. 5⅛ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 3.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	117—119	...
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	111⅛—113½	—⅛
120,420	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	98—101	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	98—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	117—120	...
274,000	Aug. 8	5	5	Newport (Mon.) 5 p.c. max. ...	97—99	...
13,200	Sept. 19	8⅔	7	Pontyp'l Gas & W. 10 p.c. 'A'	12⅝—13⅔	...
13,600	,,	6	5	Do. 7 p.c. 'B' ...	11½—12½	...
40,000	,,	6	5	Do. 7 p.c. 'C' ...	11½—12½	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	106—108	...
64,338	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—101	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb. ...	149—152	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 3.	Rise or Fall on Week.
157,150	Aug. 8	6½	5	Chester 5 p.c. Ord.	109—111	...
92,500	Dec. 19	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 22	6	6	Liverpool 5 p.c. Ord.... ...	122—124	...
245,500	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100—105	...
306,083	Jan. 23	4	4	Do. 4 p.c. Deb.... ...	100—102*	...
106,280	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 3.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	160—162	...
732,000	Aug. 22	5	5	Hartlepool G. & W. Cn. & New	82—83	—5½
2,061,315	Aug. 8	5¾	5	Newcastle & Gateshead Con.	22/9—23/3d	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	100—101	...
776,706	Dec. 19	3½	3½	Do. 3½ p.c. Deb. ...	88½—89½	+1
277,285	Oct. 24	5	5	Do. 5 p.c. Deb. '43 ...	103½—105½	...
332,351	Aug. 22	6	6	Sunderland 6 p.c. max. ...	135—137	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 3.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	133—138	...
55,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 19	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 3.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Aug. 22	6½	6½	Sheffield Cons.	139—141	...
95,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—102	...

a The quotation is per £1 of Stock.

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